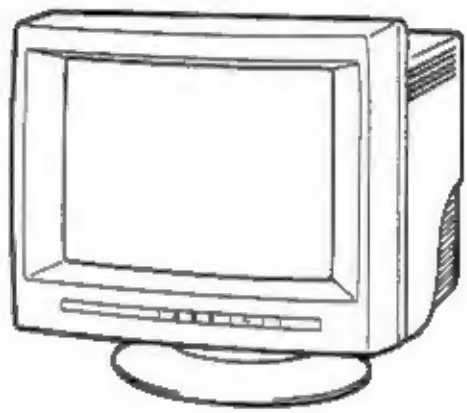
ORDER NO. FTD960605335

Service Manual

Multi-Scan Color CRT Display
MODEL 1786PS (TX-D1753V-M/-E/-A)

Chassis No. HV8

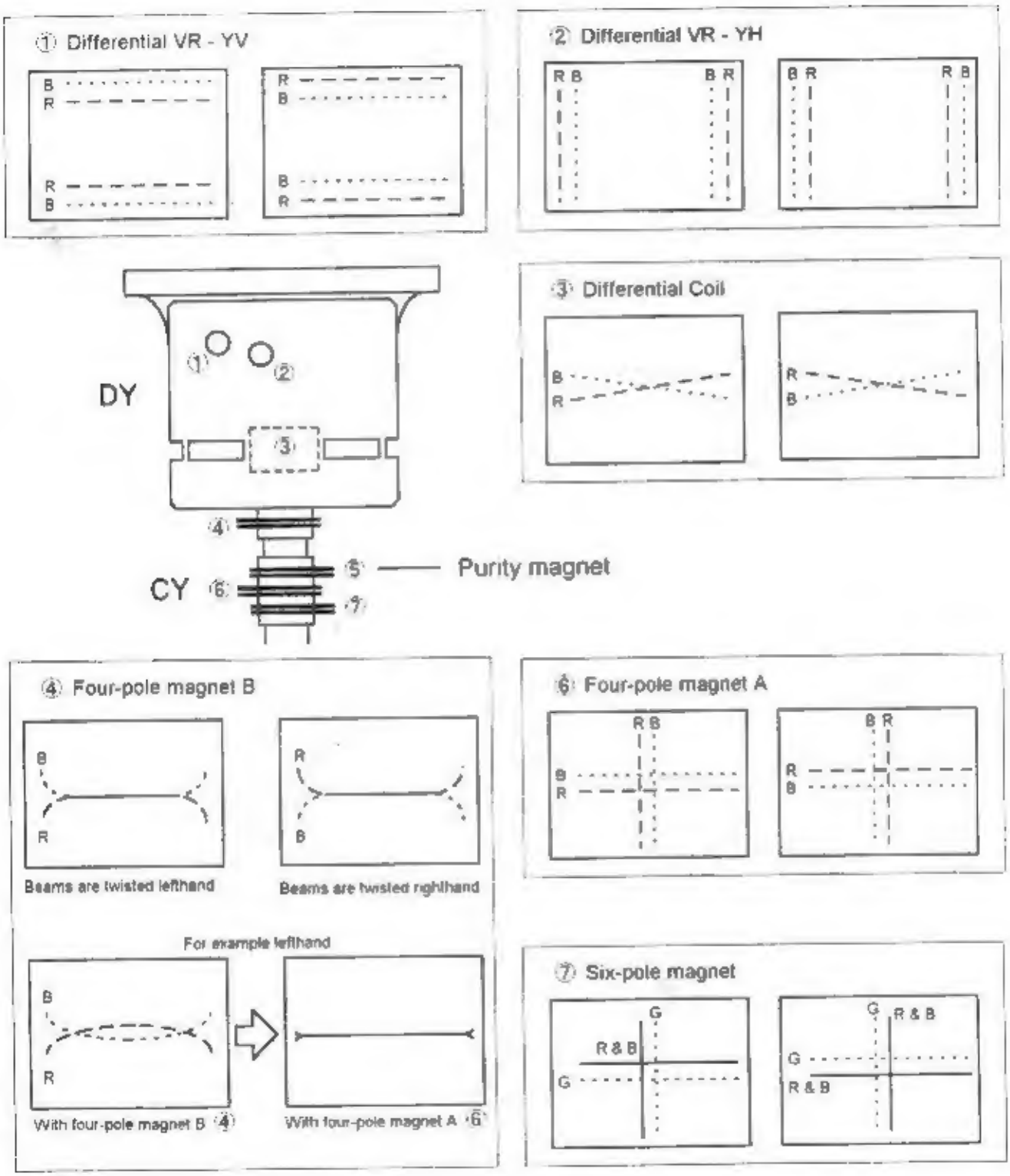
Chassis Family No.17HV8



CONTENTS

ViewSonic

2. Adjustment Location for Purity and Convergence

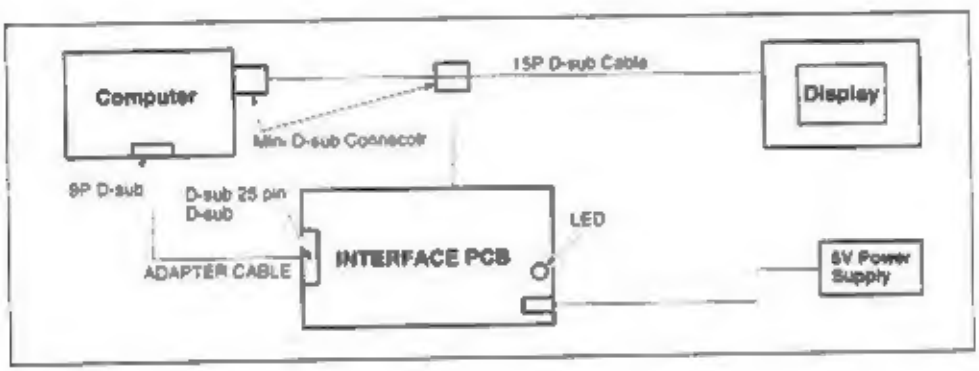


TECHNICAL INFORMATION FOR DDC

- It must be noted that this monitors is designed to be applicable to DDC1 communication the following points are different from ordinary monitors.
  1. Use the signal cable the which is furnished as an accessory (applicable to DDC1) only.
  2. When replacing a PCB on which ROM for DDC1 is mounted, data writing is required.
     In addition to the above, a computer applicable to WINDOWS and a 5V power supply unit are required.

- DDC1 Data Read/write System
  1. Communication jig
     (1) The composition of Communication jig
     ① Interface PCB ② Adapter cable (D-SUB 25P → 9P) ③ 15P D-SUB cable

     (2) Connection diagram for communication jig



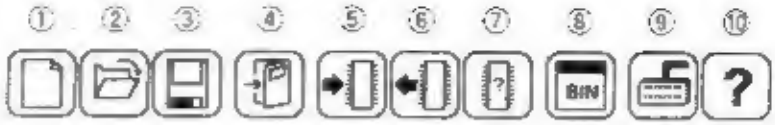
     (3) Procedure to turn on the power
     ① Make connections as shown above.
     ② Turn on the computer.
     ③ Turn on the power supply of communication jig
     ④ Turn on the power supply of the MONITOR
     (Note) If the above-mentioned operation is normal, LED of the communication jig turns green after step (4).
     If this LED is red, repeat the steps (3) and (4)

     (4) Confirmation of DDC mode
     LED is mounted on the communication jig. According to its color, the DDC mode can be discriminated.
     - When LED is green. DDC1 mode
     - When LED is orange. DDC2B mode
     - When LED is red Transmission error.
     - When LED is not lit. Obsolete

  2. Preliminary arrangements for using DDC data read/write software
     (1) Copy DDC WRITE. EXE from floppy disk to hard disk drive (Name: \PanaTool Directory)
     (2) Register DDC data read/write software (DDCWRITE.EXE) in the Icon
     ① Click the menu bar "Icon" of the program manager
     ② Select "register and group create" from the pull down menu
     ③ Select "group create"
     ④ Name the group PanaTool and register the group
     ⑤ Repeat (1) and (2) again and select "Icon registration."
     ⑥ Enter "DDC1/2B" for [Title] and "Hard disk drive name: \PanaTool\DDCWRITE.EXE" for [Command line]. Then select [OK]

  3. How to use DDC data read/write software.
     (1) Start of DDC data read/write software.
     Double-click the "DDC1/2B" Icon in the PanaTool group
     (2) Meaning of a button displayed
     The tool bar indicates the nine icons shown below

These icons are explained from left to right :



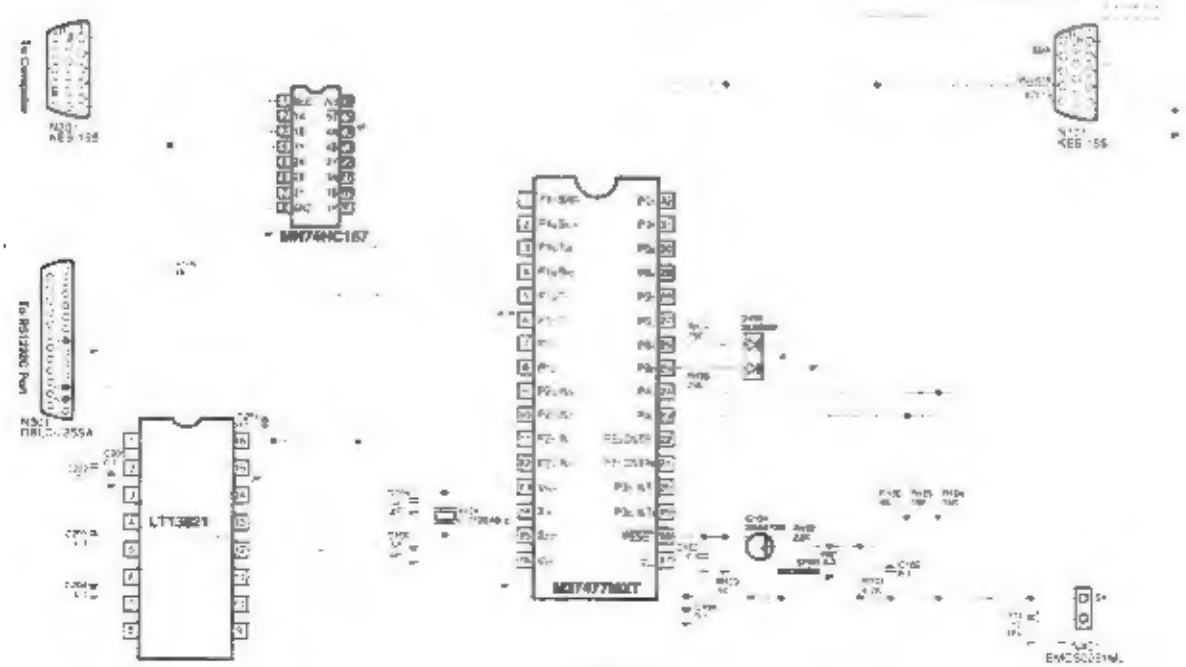
Icon ① : Initialization of screen display contents.
Icon ② : File is opened and displayed on the screen.
Icon ③ : Data are stored in a file.
Icon ④ : Finish the DDC data read/write software
Icon ⑤ : Data displayed on the screen are written in EEPROM.
Icon ⑥ : Contents of EEPROM are displayed on the screen.
Icon ⑦ : Contents of EEPROM are compared with the data displayed on the screen
Icon ⑧ : Check binary data by text format
Icon ⑨ : Communication port setting.
Contents of setting : PORT → Using Communication port No
Baud rate → 9600, Data → 8 bits, Parity → N, Stop → 1 bits
Icon ⑩ : Version information display

(3) Using the tool bar explained in (2) above, write data in EEPROM and make operations of reading, etc. A pop-up window may be displayed on the way. In such a case, select a proper one according to the message.

(Example 1) EEPROM data are displayed on the screen.
1. Click the icon (6th from the left) in the tool bar, with the arrow pointing from the memory chip.
2. Decided whether reading is started in DDC1 mode or DDC2B mode.
3. Select START.

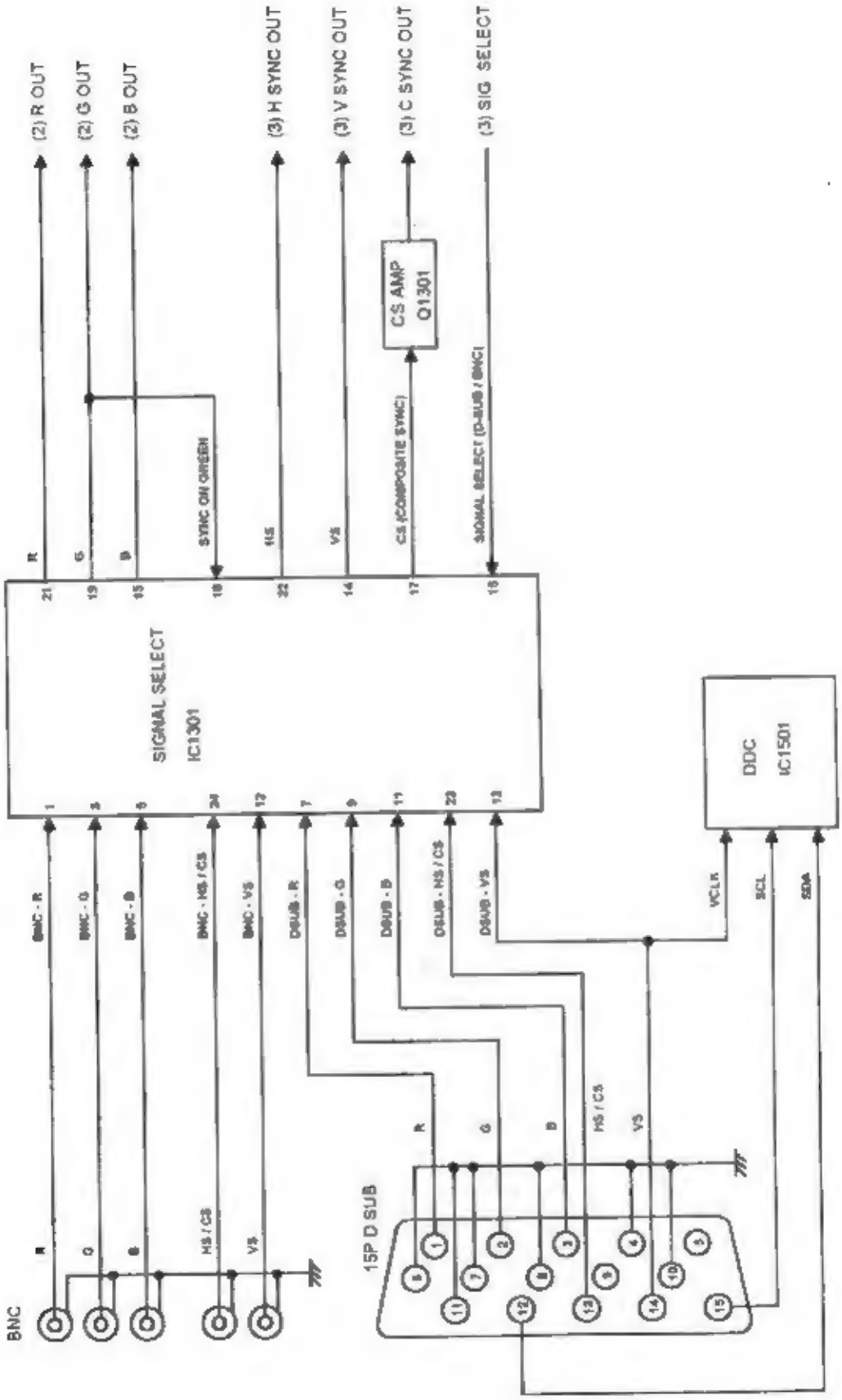
(Example 2) Data displayed on the screen are written in EEPROM.
1. Click the icon (5th from the left) in the tool bar, with the arrow pointing toward in the memory chip.
2. Select START.

SCHEMATIC DIAGRAM FOR INTERFACE

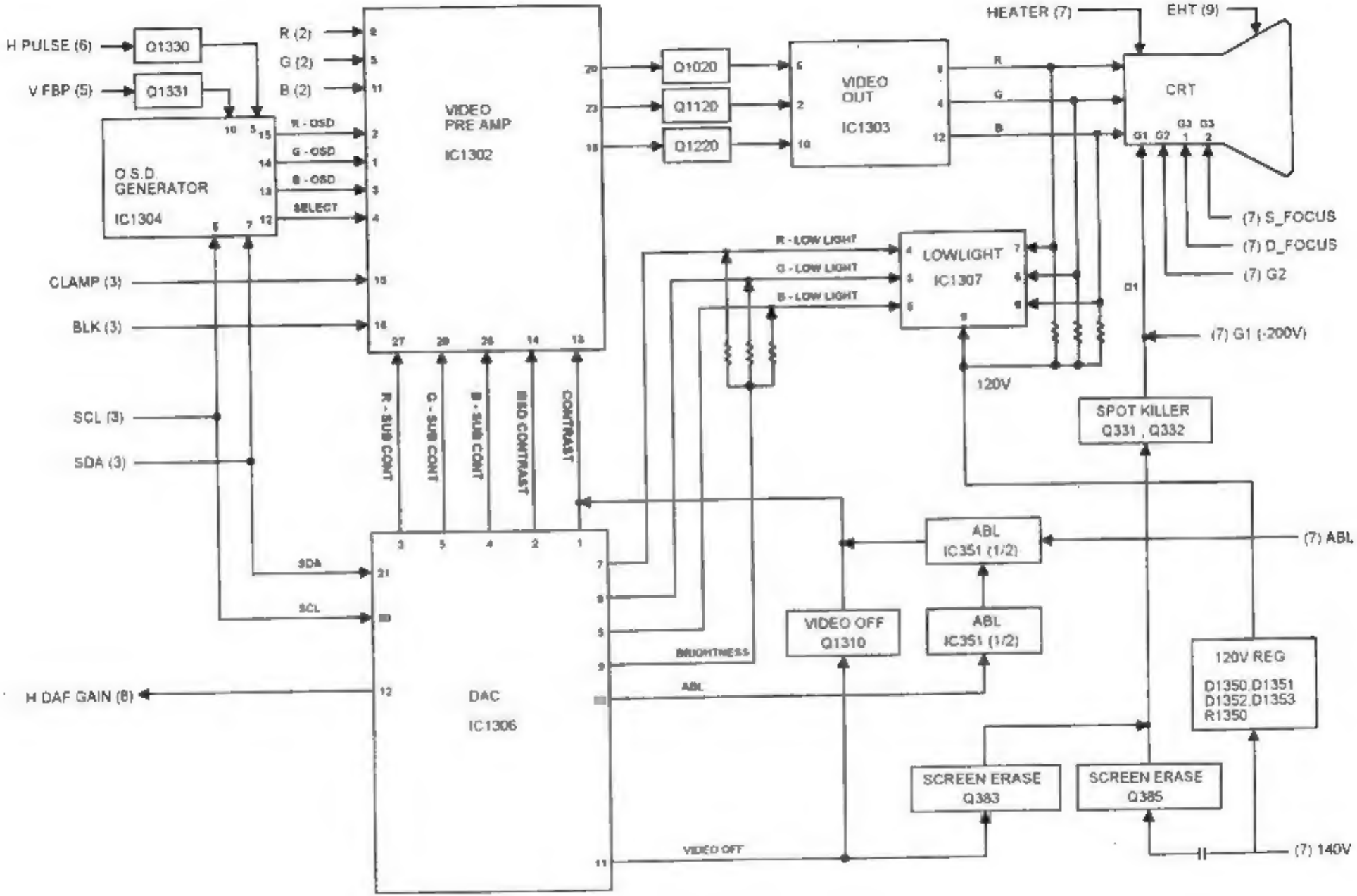


BLOCK DIAGRAM

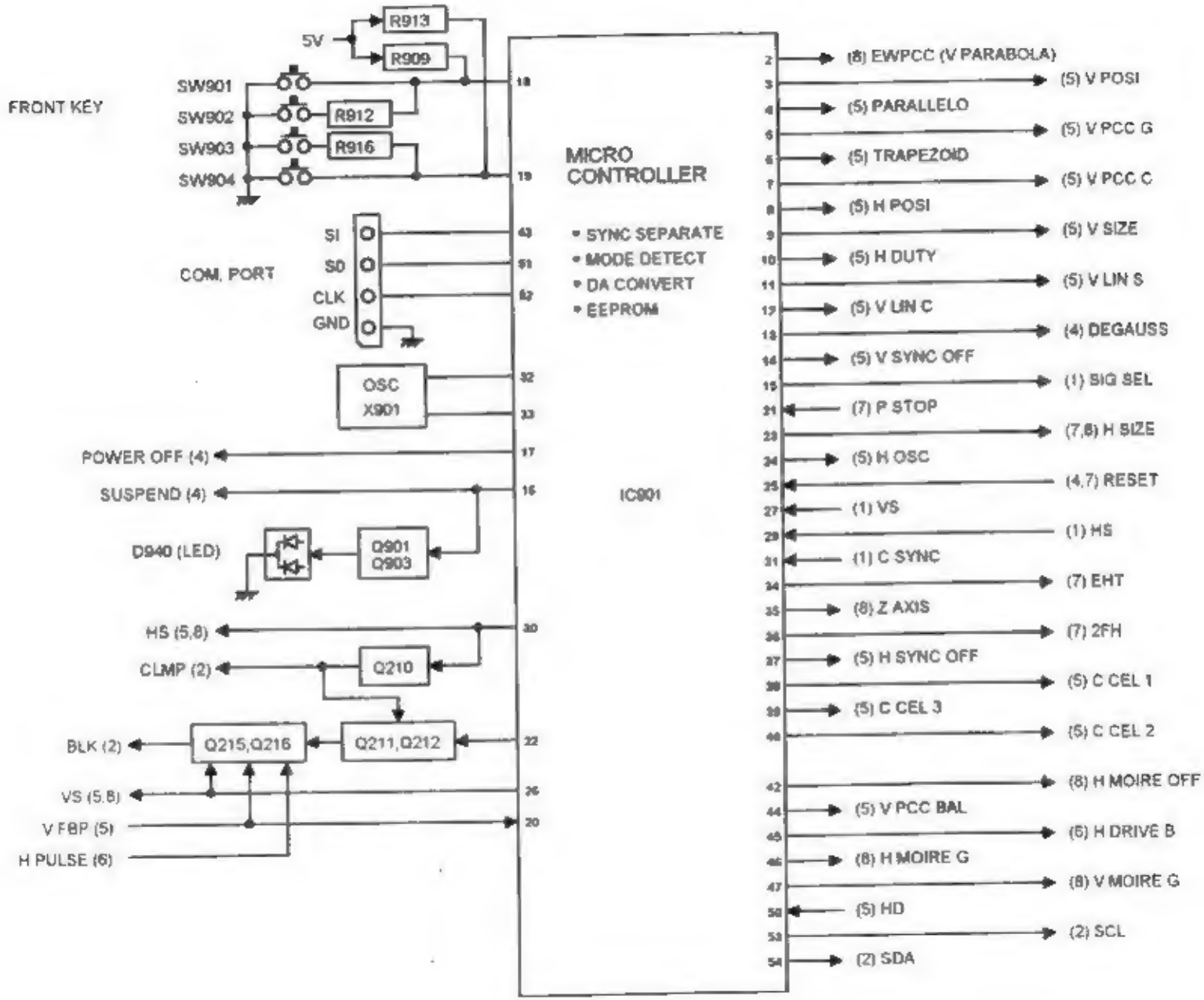
SHEET (1) SIGNAL SELECT



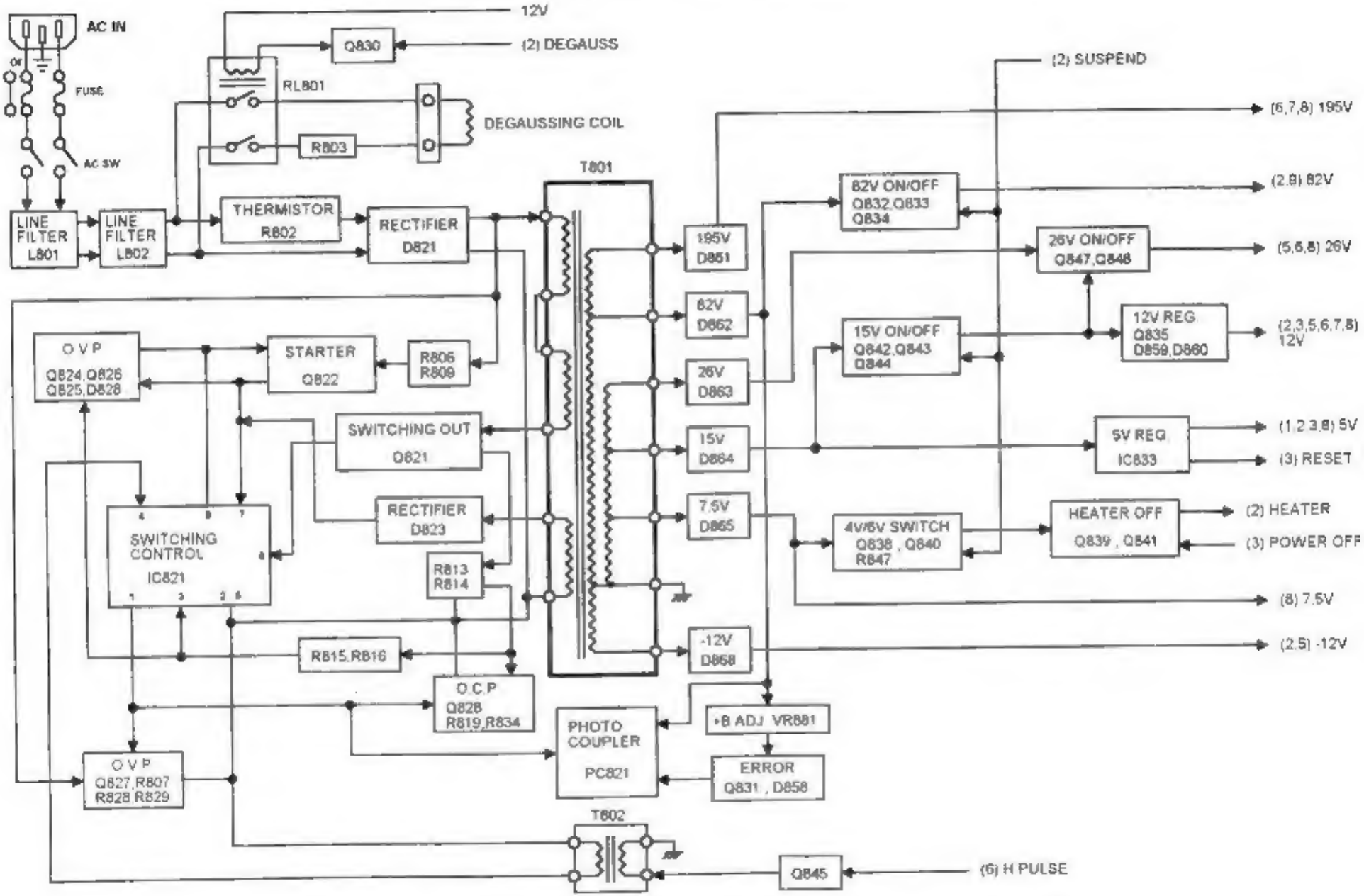
SHEET (2) VIDEO OUT



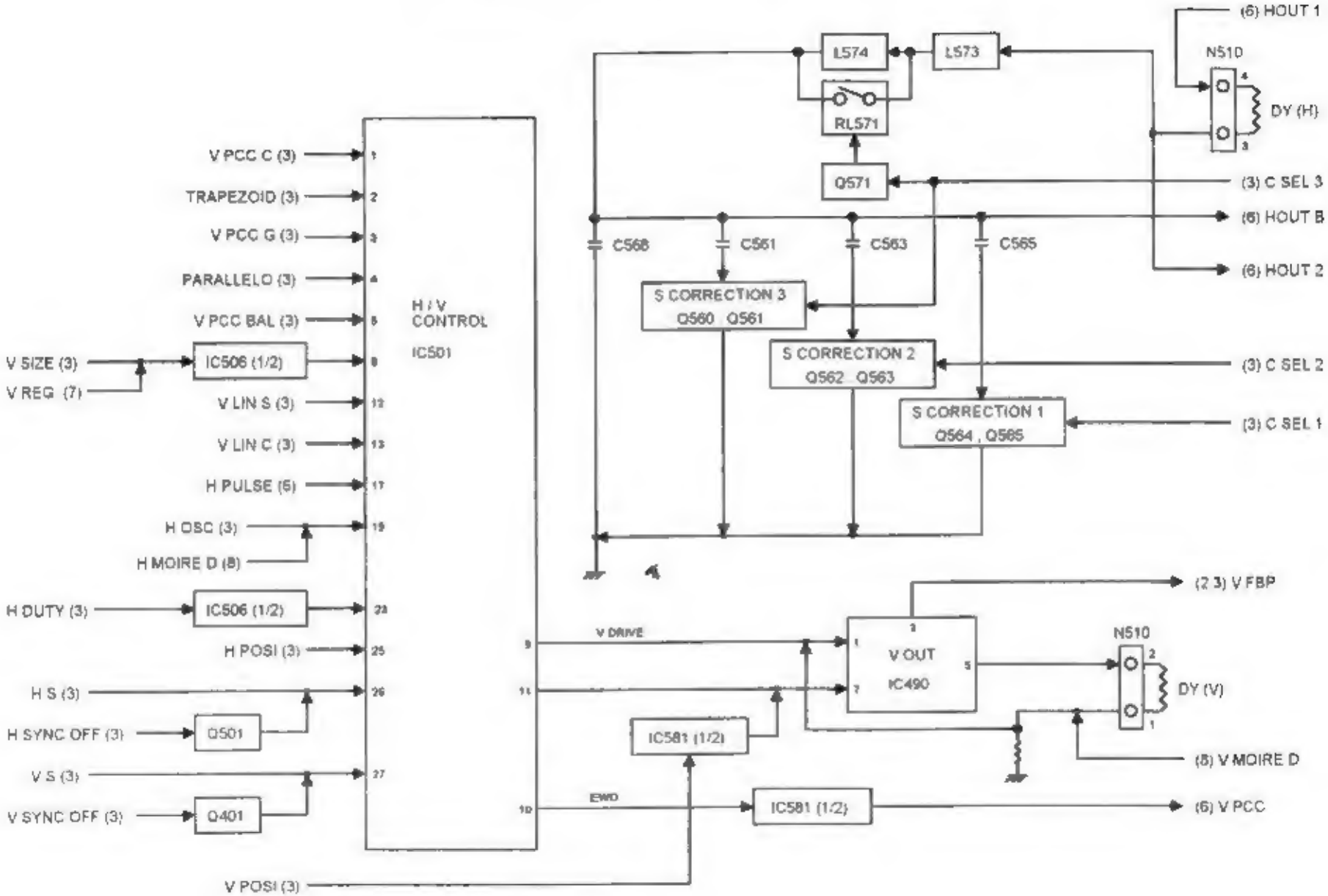
SHEET (3) MICRO CONTROLLER



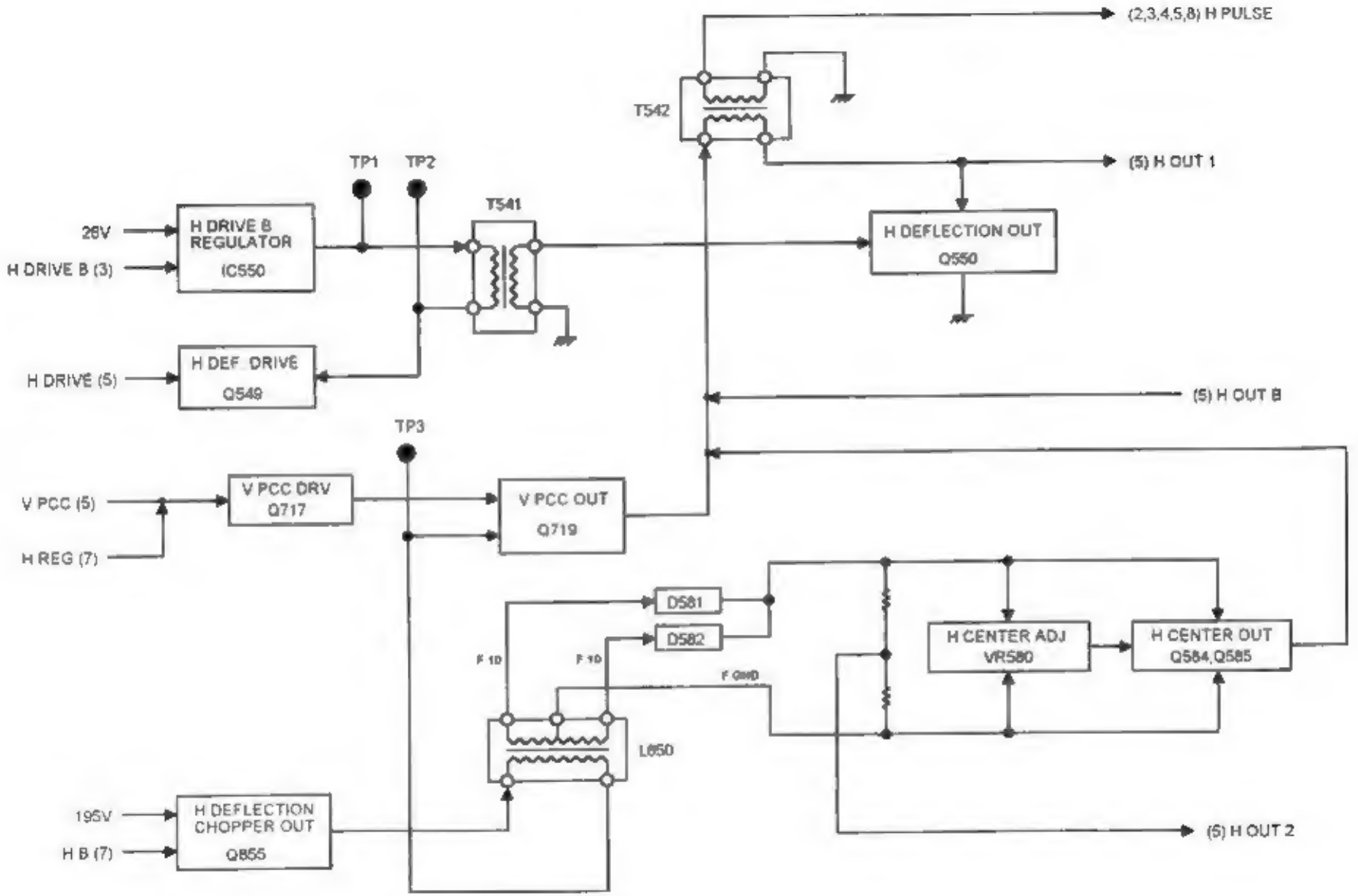
SHEET (4) POWER SUPPLY



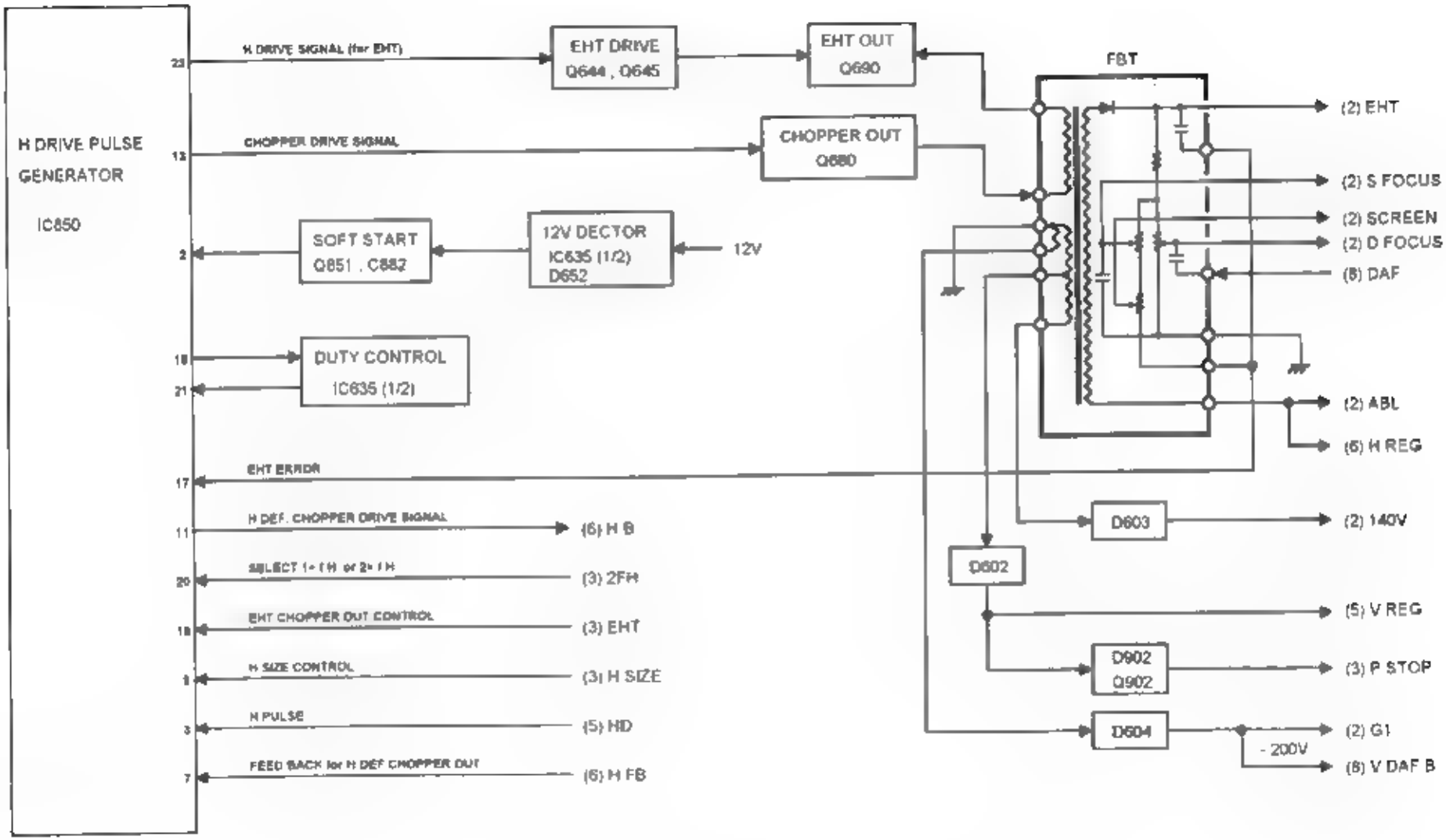
SHEET (5) H. V. CONTROL / H. LIN. / V. OUT



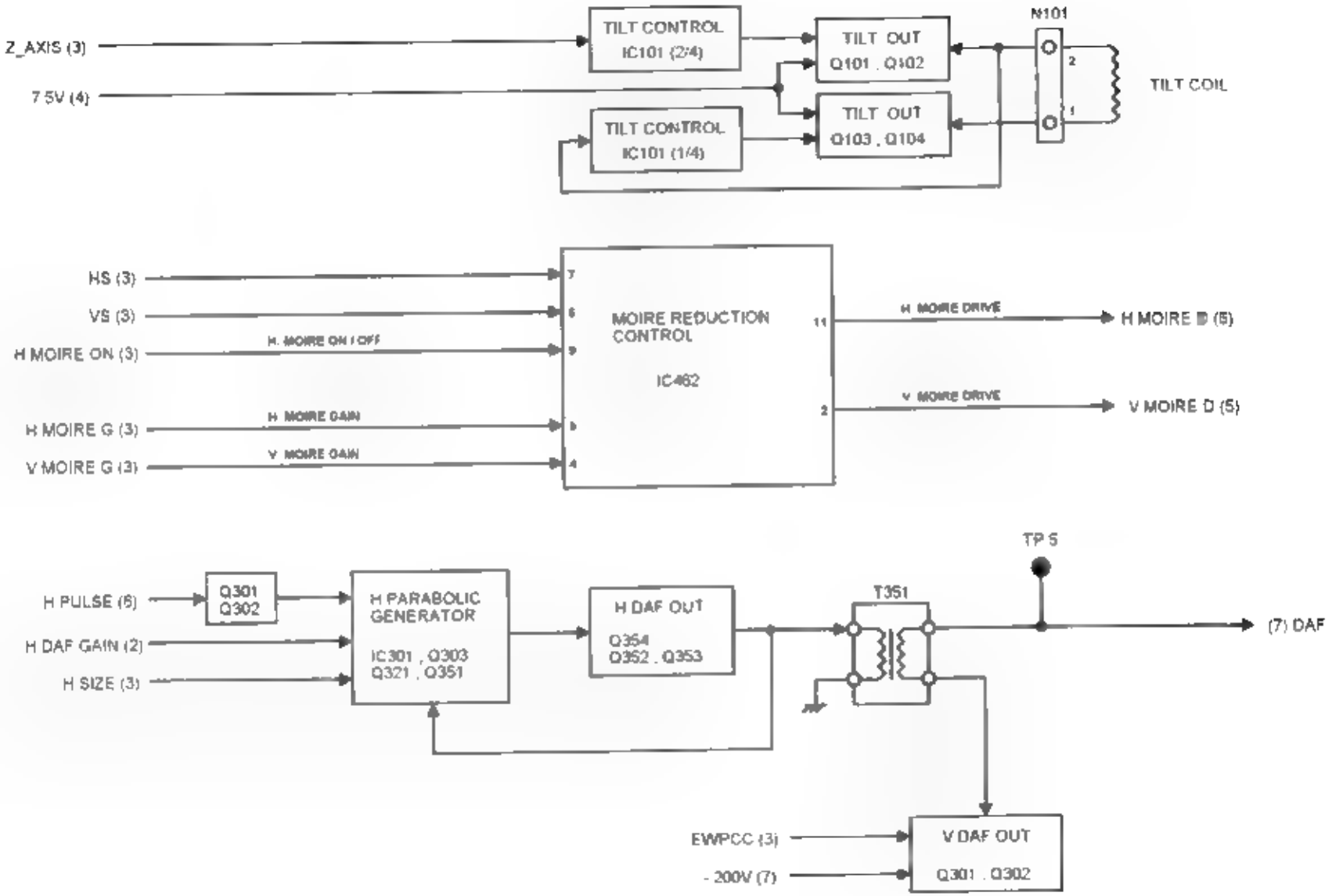
SHEET (6) H DEFLECTION OUT



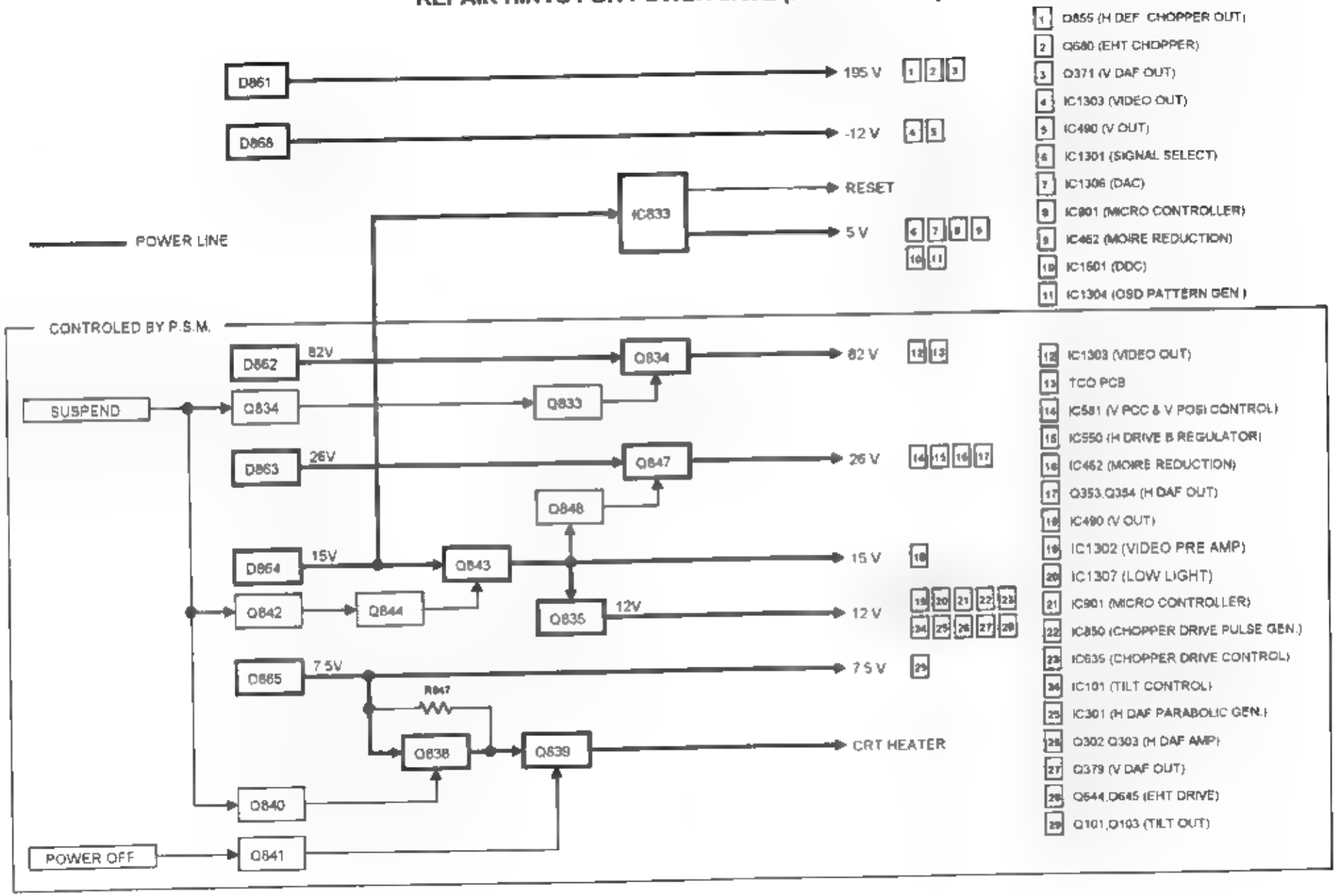
SHEET (7) H DRIVE / EHT OUT



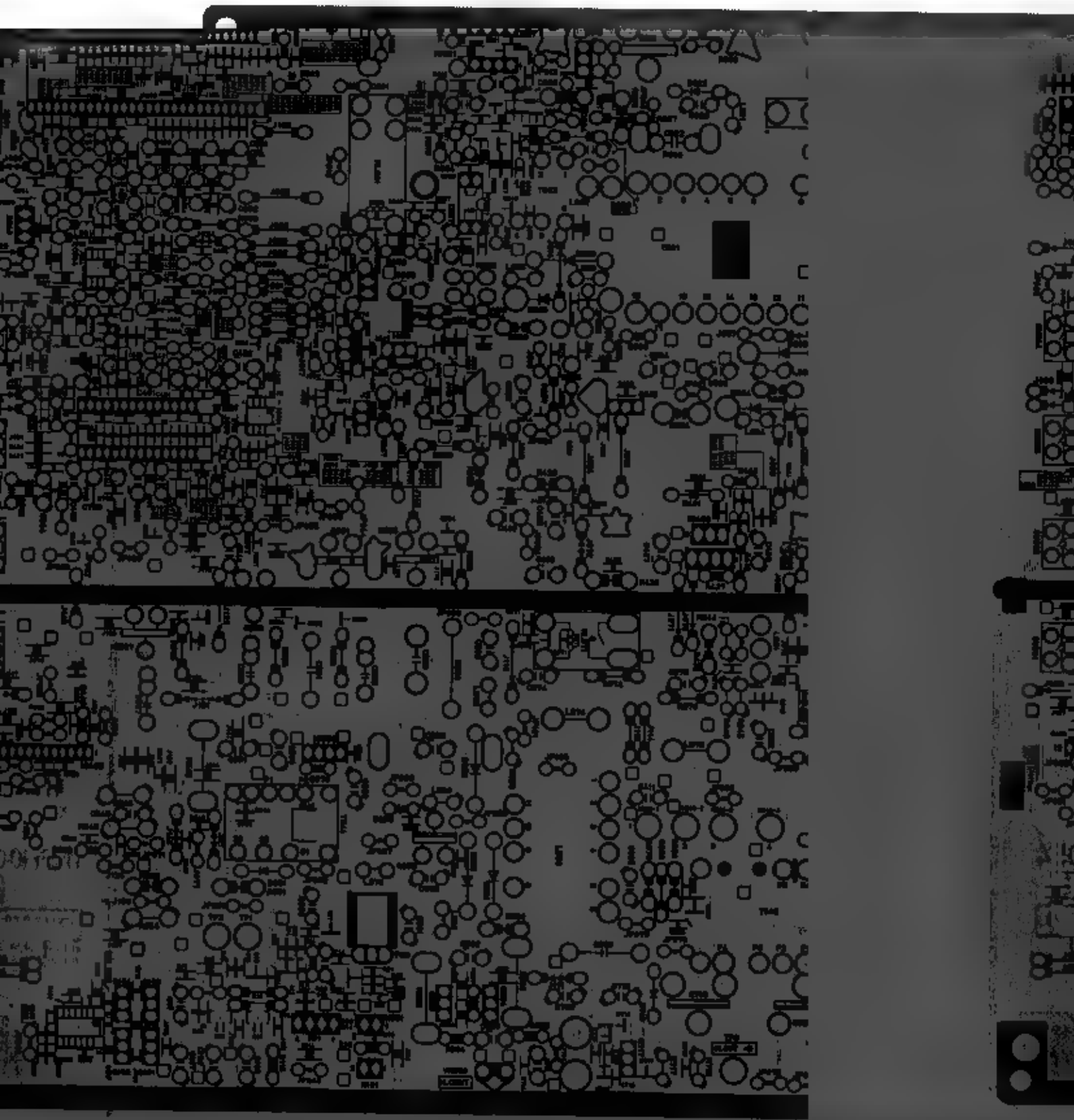
SHETT (8) TILT CONTROL / DAF OUT / MOIRE REDUCTION



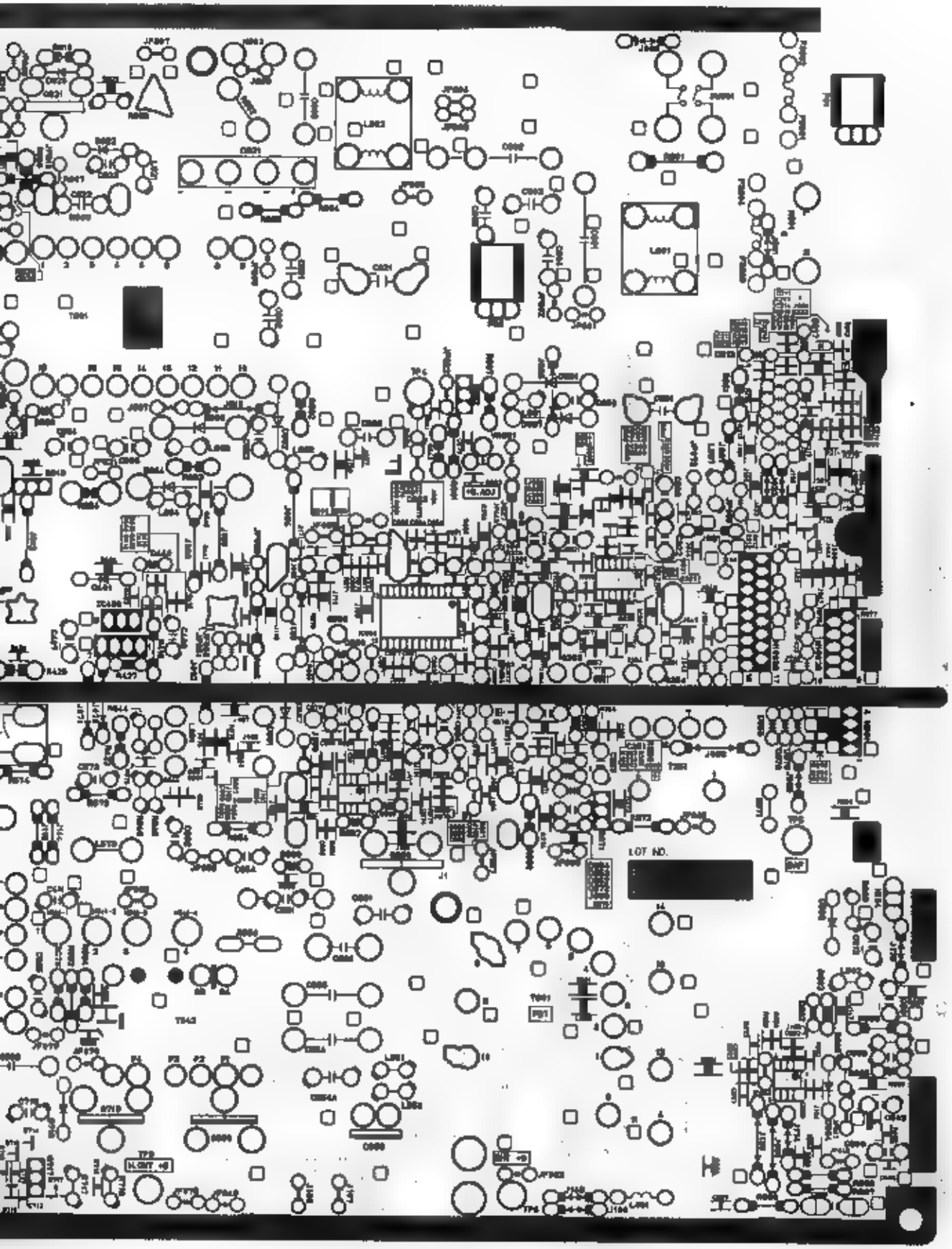
REPAIR HINTS FOR POWER SAVE (HV8 CHASSIS)



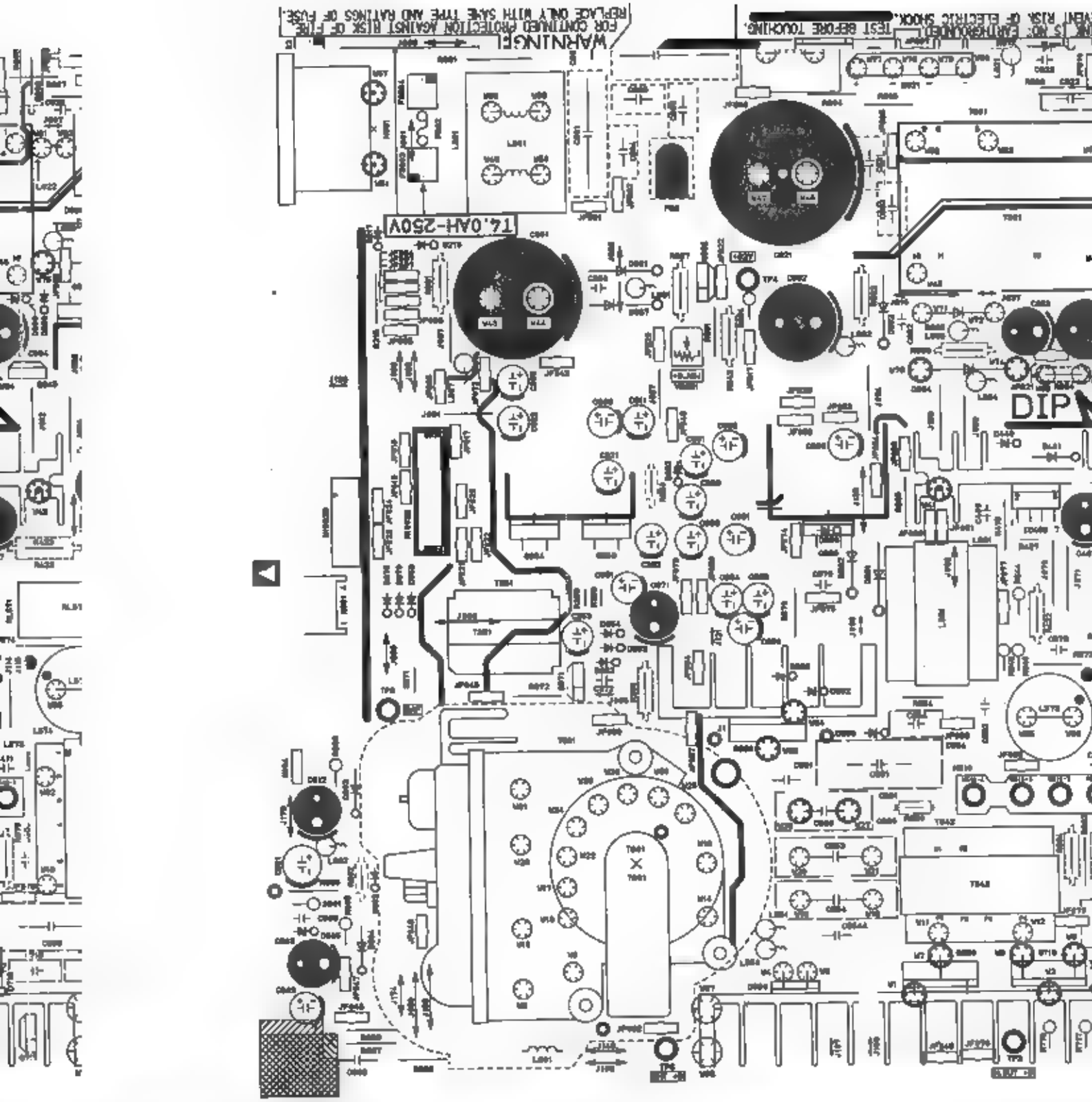
MAIN BOARD (Solder side)



CONDUCTOR VIEW

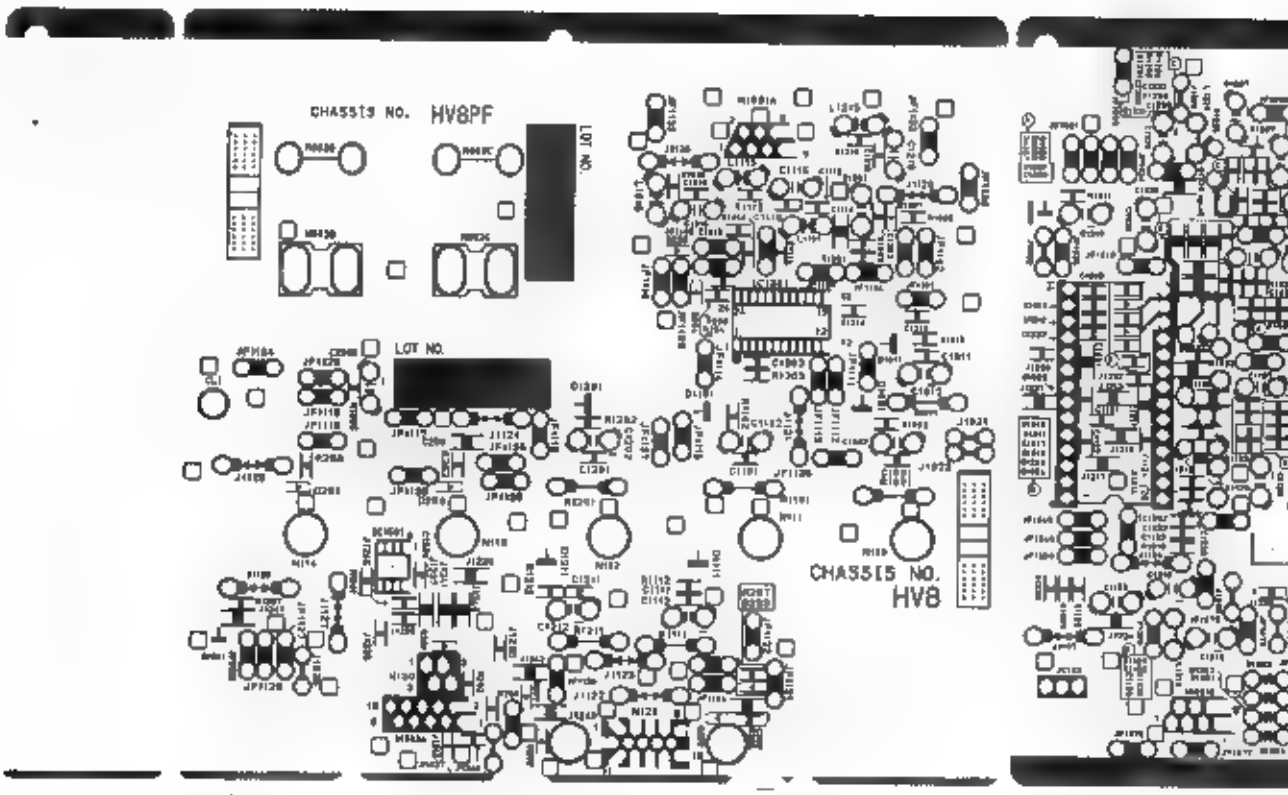


MAIN BOARD (Parts side)

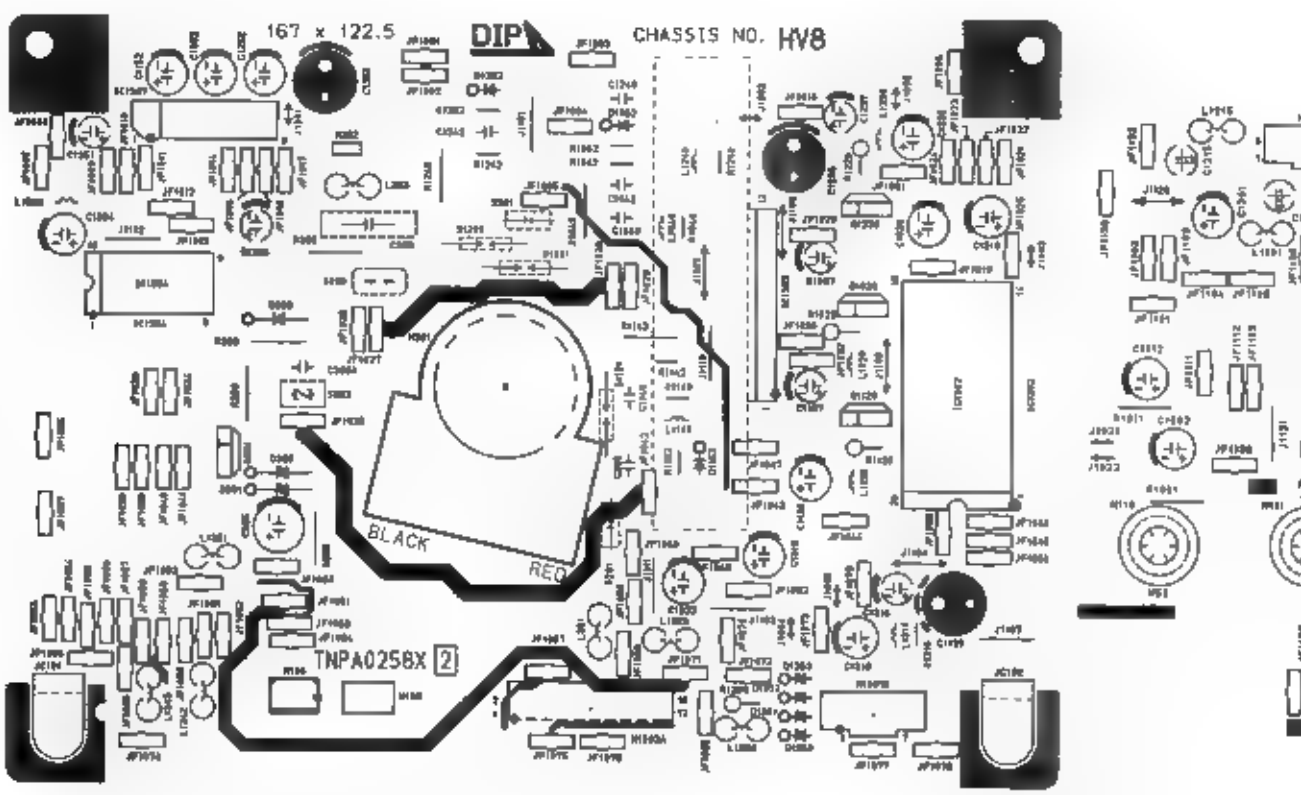


WARNING
LED
TNPH0054
3
CHASSIS NO.
HV8
HV8PF

VIDEO BOARD (Solder side)



VIDEO BOARD (Parts side)



LOT NO.
CHASSIS NO.
HV8

W-327 H-246
CHASSIS NO. HV8PF
TNPA0258Z 2
DIP
CHASSIS NO. HV8
TNPA0258Y 2
DIP

SCHEMATIC DIAGRAM

IMPORTANT SAFETY NOTICE

The component identified by shading or international symbol ⚠ on the following schematic diagrams incorporate special features important for protection from X-Radiation, fire and electrical shock hazards. When servicing it is essential that only manufacturer's specified parts be used for those critical components.

NOTES :

1. RESISTOR

All resistors are carbon 1/4W resistor, unless otherwise noted by the following marks

Unit of resistance is ohm (Ω), (K = 1,000, M = 1,000,000)

- Non Flammable
- Metal Oxide
- Wire Wound
- Fusible
- Flame Proof Rectangular
- Solid
- Metal (Precision and high stability)
- Thermistor
- Positive coefficient Thermistor

2. CAPACITOR

All capacitors are ceramic 50V capacitor, unless otherwise noted by the following marks

Unit of capacitance is μF, unless otherwise noted.

- Electrolytic
- Tantalum
- NP Bipolar
- Polystyrene
- Temperature Compensation
- Polyester
- Metalized Polyester
- Polypropylene
- Mica
- Ceramic
- Ceramic (SL)

3. COIL

Unit of inductance is μH, unless otherwise noted.

4. VOLTAGE MEASUREMENT

Voltage is measured by a digital meter receiving normal signal.

5. This schematic diagram is the latest at the time of printing and is subject to change without notice.

SERVICE NOTES :

This model has a section that does not share a common ground with the power supply section. The different sections are referred to as the HOT section and the COLD section in the precautions below.

1. Do not touch the HOT section and the COLD section at the same time. You may receive an electric shock.
2. Do not short the HOT section to the COLD section. This could blow the fuse or damage parts.
3. Never measure the HOT section and the COLD section at the same time when using tools such as oscilloscopes or multimeters.
4. Always unplug the unit before beginning any operation such as removing the chassis.

⚠WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public.

It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.

Products powered by electricity should be serviced or repaired only by experienced professional technicians.

Any attempt to service or repair the product or products dealt within this service information by anyone else could result in serious injury or death.

SAFETY PRECAUTIONS

1 CAUTION:

No modification of any circuit should be attempted. Service work should only be performed after you are thoroughly familiar with all of the following safety checks and servicing guidelines.

2 SAFETY CHECK

Care should be taken while servicing this CRT display because of the high voltage used in the deflection circuits. These voltages are exposed in such areas as the associated flyback and yoke circuits.

3 FIRE & SHOCK HAZARD

3-1 Insert an isolation transformer between the CRT display and AC power line before servicing the chassis.

3-2 In servicing, pay attention to original lead dress, especially in the high voltage circuit. If a short circuit is found, replace all parts which have been overheated as a result of the short circuit.

3-3 All the protective devices must be reinstalled per original design.

3-4 Soldering must be inspected for possible cold solder joints, frayed leads, damaged insulation, solder splashes or sharp solder points. Be certain to remove all foreign material.

4 LEAKAGE CURRENT COLD CHECK

4-1 Unplug the AC cord and connect a jumper between the two prongs on the plug.

4-2 Turn the CRT display power switch "on".

4-3 Measure the resistance value with an ohmmeter between the jumpered AC plug and each exposed metallic part on the CRT display such as the metal frame, screwheads, control shafts, etc. When the exposed metallic part has a return path to the chassis, the reading should be 1.8 megohm minimum.

5 LEAKAGE CURRENT HOT CHECK

5-1 Plug the AC cord directly into the AC outlet. Do not use an isolation transformer during this check.

5-2 Connect a 1500 ohm, 10 watt resistor, paralleled by a 0.15μF capacitor between each exposed metallic part and a good earth ground (as shown in Fig.1).

5-3 Use an AC voltmeter with 1000 ohm/volt or more sensitivity and measure the AC voltage across the combination 1500 ohm resistor and 0.15μF capacitor.

5-4 Move the resistor connection to each exposed metallic part and measure the voltage.

5-5 Reverse the polarity of the AC plug in the AC outlet and repeat the above measurement.

5-6 Voltage measured must not exceed 7.5 volt RMS. This corresponds to 0.5 milliamp. If the exposed metallic part to ground. Any leakage current tester may be used in the above hot check, in which case any current measured must not exceed 5.0 milliamp. In the case of a measurement exceeding the 5.0 milliamp value, a rework is required to eliminate the chance of a shock hazard.

Note: High voltage is present when this CRT display is operating. Always discharge the anode of the picture tube to the display chassis to prevent shock hazard.

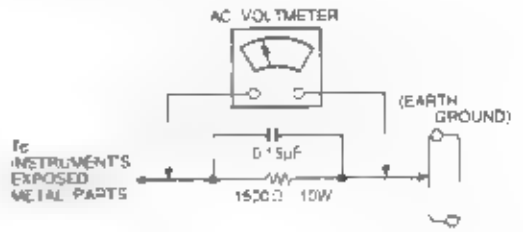


Fig.1

6 IMPLOSION PROTECTION

Picture tubes are equipped with an integral implosion protection system, but care should be taken to avoid damage and scratching during installation. Use only Panasonic replacement picture tubes.

7 X-RADIATION

WARNING: The only potential source of X-Radiation is the picture tube. However when the high voltage circuitry is operating properly there is no possibility of X-Radiation problem. The basic precaution which must be exercised is to keep the high voltage at the following factory-recommended level.

Note: It is important to use an accurate periodically calibrated high voltage meter.

7-1 The procedure for adjustment high voltage is as shown on page 27.

7-2 If can not be adjust 25.0 kV at immediate service is required to prevent the possibility of premature component failure.

7-3 To prevent X-Radiation possibility it is essential to use the specified picture tube.

IMPORTANT SAFETY NOTICE

There are special components used in this CRT displays which are important for safety. These parts are identified by the international symbol ⚠ on the schematic diagram and on the replacement parts list. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent X-RADIATION, shock, fire or other hazards. Do not modify the original design without written approval. Unauthorized changes will void the original parts and labor guarantee.

GENERAL INFORMATION

1. OUTLINE

1786PS is a 17 inch multi-scan color CRT display with the following features

•Multi scan •Digital control •OSD (On Screen Display) control •Power saving •High contrast and fine dot pitch CRT

2. FEATURES

2-1 Power Saving

- Built in Power Saving function based on VESA-DPMS standard. Power energy shall be saved by controlling the circuit in accordance with power save signal from computer

2-2 OSD (on screen display) function

- OSD (5 languages) is a man-machine interface Any one is able to set up the picture as he like through OSD menu.

2-3 Self Test function

- With a touch of a button (1) the self-test function quickly identifies a "no signal condition" This time saving function simplifies diagnostics and prevents unnecessary service calls

2-4 Ergonomic design

- Low emission design to meet MPR II
- ESF (Electro static field) free coating on CRT

2-5 Multi scan with digital technology

- 8 bit micro computer controls the circuit operation to meet with wide range signal of f_H=30–86kHz and f_V=50–160 Hz. So VGA640x350 VGA640x400 VGA640x480, SVGA800x600, 1024x768 and 1280x1024 mode are applicable.

2-6 1 Factory preset, (–7 Reservation), 13 user memories.

- 1 standard modes are preset at the factory.
- 7 modes are reserved at the factory.
- 13 user memories are available to set the users own timing and display information

2-7 Flat Face and fine dot pitch

- Flat face CRT with a fine dot pitch of 0.25 mm provides for comfortable viewing

2-8 Superior display performance

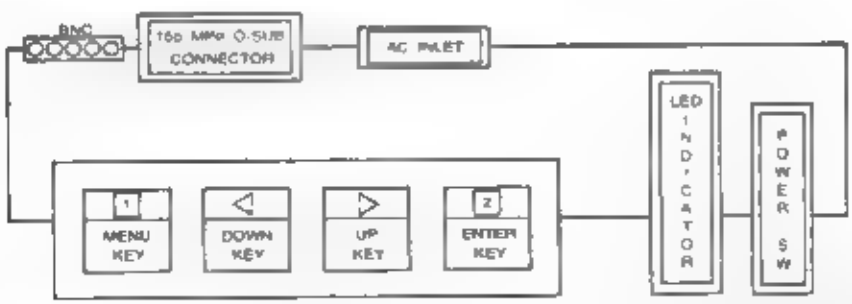
- Good focus by sophisticated gun and dynamic focus circuit
- High contrast
- Minimized distortion by correction circuit
- Good convergence
- Users enjoy full scan image for graphics

2-9 Additional function

- Moire reduction circuit
- Rotation control circuit
- VESA/DDC1 & DDC2B (Display Data Channel) Compatible

SPECIFICATION

1. DIAGRAM



1.1 POWER SW, LED, 1-key (MENU), <-key (DOWN), >-key (UP), and 2-key (ENTER) are located on the front panel

1.2 Signal connector and AC inlet are located on the back side of the cabinet

1.3 OSD menu includes the following function.

CONTRAST	BRIGHTNESS	DEGAUSS
RECALL	H. POSITION	H. SIZE
V. POSITION	V. SIZE	V. PINCUSHION
TRAPEZOID	PARALLELOGRAM	ROTATION
COLOR SELECT	DISPLAY FREQUENCY	
VIDEO INPUT LEVEL	VIDEO INPUT SELECT	
H. MOIRE	V. MOIRE	LANGUAGES

※) CONTRAST can be directly controlled with <!/> -key

※) VIDEO INPUT SELECT can be directly controlled by pushing 2 -key.

※) With sync signal OSD menu appears by pushing 1-key.
Without sync signal, self test menu appears by pushing 1-key.

2. MECHANICAL SPECIFICATIONS

... refer to the attached drawing

2.1 Dimension Height : 416 mm (16.4") typ.
Width : 410 mm (16.1") typ.
Depth : 444 mm (17.5") typ.

2.2 Net Weight : 18.0 kg (39.5 lbs) typ.

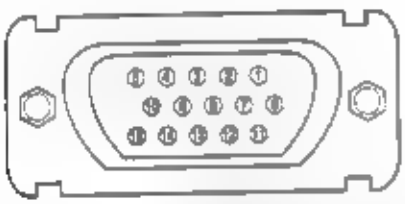
2.3 Maximum Viewable Phosphor Display Area
: 406.4 mm (16.0") typ.

3. CONNECTORS

3.1 Signal connector: 15P Mini D-Sub connector
BNC CONNECTOR x 5

3.2 AC inlet CEE 22 typed connector

<15P Mini D-Sub Pin assignment>



1	RED	6	GROUND
2	GREEN	7	GROUND
3	BLUE	8	GROUND
4	GROUND	9	- (OPEN)
5	GROUND (DDC)	10	GROUND
11	GROUND		
12	SDA (DDC)		
13	H. SYNC		
14	V. SYNC		
15	SCL (DDC)		

4. CRT SPECIFICATIONS

Part No.	M4*KXH147X
Type	17" 90° 29B in-line gun (16.0" viewable)
Dot Pitch	0.25 mm
Phosphor	R, G, B Short Persistence (H. Eff. RED)
CIE Color point	Red x 0.635 (± 0.020) y 0.333 (± 0.020)
	Green x 0.280 (± 0.020) y 0.596 (± 0.020)
	Blue x 0.152 (± 0.015) y 0.063 (± 0.015)
Bulb	DARK TINT
Face	NEW AGRAS COAT
Total Transmission	42.5 %

5. ELECTRICAL SPECIFICATIONS

5.1 **Standard conditions** ... Except specified items

Display image	Green, full "H" characters with a border line (7 x 9 dots) Video signal : 100% duty Display area : 300 mm x 225 mm
Video signal level	0.7 V pp
Contrast, Brightness	Contrast : Max., Brightness : center point
Ambient Temperature	20 ± 5°C (68 ± 9°F)
Input Voltage	AC 120 V, 60 Hz or 220 V 50 Hz
Terrestrial magnetism	Vertical field : northern hemisphere field (40μT) southern hemisphere field (-40μT) Horizontal field : no field
Viewing direction	Parallel to the CRT axis
Measurements	After an initial warming up time of more than 30 minutes
Ambient light	200 ± 50 lx
Display mode	1024 x 768 (60.02 kHz, 75.03 Hz)

5.2 **POWER**

5.2.1 **Power supply** ... Commercial power source

Input voltage	AC 90 - 132 V	AC 198 - 264 V
Power frequency	50 Hz ± 3 Hz	60 Hz ± 3 Hz
Input current	2.0 A Max. (100V)	
Inrush current (at 25° C)	40 A op	Note: Cold Start
Power consumption	120 W (Typ.)	

5.2.2 **Power Management for Power Saving** ...

Power saving system is designed based upon VESA DPMS standard (Version : 1.0)

*) Power consumption and recovery time.

*1 APM State	SIGNALS H. Sync	V. Sync	VIDEO	MONITOR POWER CONSUMPTION	RECOVERY TIME TO ON STATE	INDICATOR
ON	*3 NORMAL	*3 NORMAL	*2 ACTIVE	*4 100%	—	Green
STAND-BY	No Sync or *5 < 6 kHz	> 40 Hz	BLANK	< 30 W	< 4s	Yellow
SUSPEND	> 50 kHz	No Sync or *5 < 20 Hz	BLANK	< 30 W	< 4s	Yellow
OFF	No Sync or *5 < 6 kHz	No Sync or *5 < 20 Hz	BLANK	< 8 W	< 20s	Yellow

** The transition time from ON state to each APM state is 5 seconds minimum.

*1 APM : Advanced Power Management.

*2 Means Condition of power consumption for ON state
DISPLAY IMAGE : WHITE full "H" characters with a border line (7 × 9 dots)

*3 NORMAL See "7.4 ACCEPTABLE TIMING"

*4 Power Consumption is measured at AC 100-240V

*5 Power saving operation is done at least less than specified value in the list

5.3 **Standard timing (Standard mode)**

- Following 7 mode (7 modes) are preset (reserved) in the memory as standard timing at the factory.
- Fig-1 shows a definition of timing and signal level.
- Electrical performance is specified. This SPECIFICATION is specified at STD (1024 x 768) mode unless otherwise mentioned. (MODE-5)

TIMING CHART

A	Period
B	Blanking
C	Sync Width
D	Back Porch
E	Active
F	Front Potch

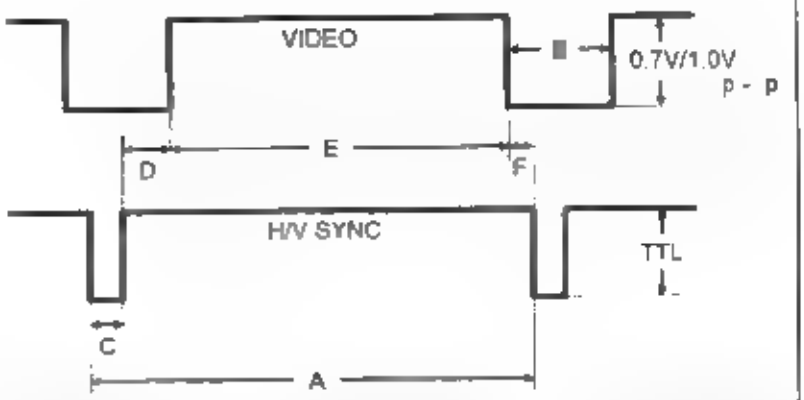


Fig.1

		PRESET	RESERVATION	RESERVATION
		MODE - 1	MODE - 2	MODE - 3
		1024 × 768 (75)	640 × 480 (60)	640 × 480 (75)
DOT CLOCK		78.7500 MHz	25.1745 MHz	31.5000 MHz
H	f H	60.0229 kHz	31.4681 kHz	37.5000 kHz
H	A - PERIOD	16.660 µs (1,312 dots)	31.778 µs (800 dots)	26.667 µs (840 dots)
H	B - BLANKING TIME	3.657 µs (288 dots)	6.356 µs (160 dots)	6.349 µs (200 dots)
H	C - SYNC WIDTH	1.219 µs (96 dots)	3.813 µs (96 dots)	2.032 µs (64 dots)
H	D - BACK PORCH	2.235 µs (176 dots)	1.907 µs (48 dots)	3.810 µs (120 dots)
H	E - ACTIVE TIME	13.003 µs (1,024 dots)	25.423 µs (640 dots)	20.317 µs (640 dots)
H	F - FRONT PORCH	0.203 µs (16 dots)	0.636 µs (16 dots)	0.508 µs (16 dots)
V	f V	75.0286 Hz	59.9393 Hz	75.0000 Hz
V	A - PERIOD	13.328 ms (800 lines)	16.684 ms (525 lines)	13.333 ms (500 lines)
V	B - BLANKING TIME	0.533 ms (32 lines)	1.430 ms (45 lines)	0.533 ms (20 lines)
V	C - SYNC WIDTH	0.050 ms (3 lines)	0.064 ms (2 lines)	0.080 ms (3 lines)
V	D - BACK PORCH	0.466 ms (28 lines)	1.049 ms (33 lines)	0.427 ms (16 lines)
V	E - ACTIVE TIME	12.795 ms (768 lines)	15.254 ms (480 lines)	12.800 ms (480 lines)
V	F - FRONT PORCH	0.017 ms (1 lines)	0.318 ms (10 lines)	0.027 ms (1 lines)
SYNC POLARITY(H/V)		Positive / Positive	Negative / Negative	Negative / Negative

FOR PRESET

		RESERVATION	RESERVATION	RESERVATION
		MODE - 4	MODE - 5	MODE - 6
		800 × 600 (75)	MAC 832 × 624	1024 × 768 (70)
DOT CLOCK		49.5000 MHz	57.2832 MHz	75.0000 MHz
H	f H	46.8750 kHz	49.7250 kHz	56.4759 kHz
H	A - PERIOD	21.333 µs (1,056 dots)	20.111 µs (1,152 dots)	17.707 µs (1,328 dots)
H	B - BLANKING TIME	5.172 µs (256 dots)	5.586 µs (320 dots)	4.053 µs (304 dots)
H	C - SYNC WIDTH	1.616 µs (80 dots)	1.117 µs (64 dots)	1.813 µs (136 dots)
H	D - BACK PORCH	3.232 µs (160 dots)	3.910 µs (224 dots)	1.920 µs (144 dots)
H	E - ACTIVE TIME	16.162 µs (800 dots)	14.524 µs (832 dots)	13.653 µs (1,024 dots)
H	F - FRONT PORCH	0.323 µs (16 dots)	0.559 µs (32 dots)	0.320 µs (24 dots)
V	f V	75.0000 Hz	74.5502 Hz	70.0694 Hz
V	A - PERIOD	13.333 ms (625 lines)	13.414 ms (667 lines)	14.272 ms (806 lines)
V	B - BLANKING TIME	0.533 ms (25 lines)	0.865 ms (43 lines)	0.673 ms (38 lines)
V	C - SYNC WIDTH	0.064 ms (3 lines)	0.060 ms (3 lines)	0.106 ms (6 lines)
V	D - BACK PORCH	0.448 ms (21 lines)	0.784 ms (39 lines)	0.513 ms (29 lines)
V	E - ACTIVE TIME	12.800 ms (600 lines)	12.549 ms (624 lines)	13.599 ms (768 lines)
V	F - FRONT PORCH	0.021 ms (1 lines)	0.020 ms (1 lines)	0.053 ms (3 lines)
SYNC POLARITY(H/V)		Positive / Positive	Negative / Negative	Negative / Negative

		RESERVATION MODE - 7 MAC 1024 × 768	RESERVATION MODE - 8 1280 × 1024 (75)
DOT CLOCK		80.0000 MHz	135.0000 MHz
H	f H	60.2410 kHz	79.9763 kHz
	A - PERIOD	16.600 µs (1,328 dots)	12.504 µs (1,688 dots)
	B - BLANKING TIME	3.800 µs (304 dots)	3.022 µs (408 dots)
	C - SYNC WIDTH	1.200 µs (96 dots)	1.067 µs (144 dots)
	D - BACK PORCH	2.200 µs (176 dots)	1.837 µs (248 dots)
	E - ACTIVE TIME	12.800 µs (1,024 dots)	9.481 µs (1,280 dots)
	F - FRONT PORCH	0.400 µs (32 dots)	0.119 µs (16 dots)
V	f V	74.9266 Hz	75.0247 Hz
	A - PERIOD	13.348 ms (804 lines)	13.329 ms (1,066 lines)
	B - BLANKING TIME	0.598 ms (36 lines)	0.525 ms (42 lines)
	C - SYNC WIDTH	0.050 ms (3 lines)	0.038 ms (3 lines)
	D - BACK PORCH	0.498 ms (30 lines)	0.475 ms (38 lines)
	E - ACTIVE TIME	12.749 ms (768 lines)	12.804 ms (1,024 lines)
	F - FRONT PORCH	0.050 ms (3 lines)	0.013 ms (1 lines)
SYNC POLARITY(H/V)		Negative / Negative	Positive / Positive

		ADJUSTMENT 61 HV8 - 1	ADJUSTMENT HV8 - 2	ADJUSTMENT HV8 - 4
DOT CLOCK		22.6000 MHz	40.2479 MHz	86.0645 MHz
H	f H	29.5039 kHz	38.9999 kHz	64.5200 kHz
	A - PERIOD	33.894 µs (766 dots)	25.641 µs (1,032 dots)	15.500 µs (1,334 dots)
	B - BLANKING TIME	6.018 µs (136 dots)	5.988 µs (241 dots)	3.602 µs (310 dots)
	C - SYNC WIDTH	4.115 µs (93 dots)	2.832 µs (114 dots)	1.185 µs (102 dots)
	D - BACK PORCH	1.283 µs (29 dots)	2.435 µs (98 dots)	1.975 µs (170 dots)
	E - ACTIVE TIME	27.875 µs (630 dots)	19.653 µs (791 dots)	11.898 µs (1,024 dots)
	F - FRONT PORCH	0.619 µs (14 dots)	0.721 µs (29 dots)	0.442 µs (38 dots)
V	f V	48.0520 Hz	77.0749 Hz	105.0814 Hz
	A - PERIOD	20.811 ms (614 lines)	12.974 ms (506 lines)	9.516 ms (614 lines)
	B - BLANKING TIME	0.915 ms (27 lines)	0.744 ms (29 lines)	0.480 ms (31 lines)
	C - SYNC WIDTH	0.102 ms (3 lines)	0.103 ms (4 lines)	0.046 ms (3 lines)
	D - BACK PORCH	0.712 ms ([illegible] lines)	0.513 ms (20 lines)	0.356 ms ([illegible] lines)
	E - ACTIVE TIME	19.896 ms (587 lines)	12.231 ms (477 lines)	9.036 ms (583 lines)
	F - FRONT PORCH	0.102 ms (3 lines)	0.128 ms (5 lines)	0.077 ms (5 lines)
SYNC POLARITY(H/V)		Negative / Negative	Negative / Negative	Negative / Negative

		ADJUSTMENT HV8 - 6
DOT CLOCK		190.9800 MHz
H	f H	86.0270 kHz
	A - PERIOD	11.624 µs (2,220 dots)
	B - BLANKING TIME	2.932 µs (560 dots)
	C - SYNC WIDTH	0.984 µs (188 dots)
	D - BACK PORCH	1.623 µs (310 dots)
	E - ACTIVE TIME	8.692 µs (1,660 dots)
	F - FRONT PORCH	0.325 µs (62 dots)
V	f V	165.1191 Hz
	A - PERIOD	6.056 ms (521 lines)
	B - BLANKING TIME	0.430 ms (37 lines)
	C - SYNC WIDTH	0.035 ms (3 lines)
	D - BACK PORCH	0.384 ms (33 lines)
	E - ACTIVE TIME	5.626 ms (484 lines)
	F - FRONT PORCH	0.012 ms (1 lines)
SYNC POLARITY(H/V)		Negative / Negative

5.4 Acceptable timing

- If your timing is within following specification, this CRT display can automatically function with a certain size and position.

Horizontal:	Sync frequency:	30.0 – 86.0 kHz
	Blanking Time:	≥ 3.0 µs
	Back Porch:	≥ 1.25 µs
	Front Porch:	≤ Back Porch
	Sync Width:	≥ 1.2 µs
Vertical:	Sync frequency:	50.0 – 160.0 Hz
	Blanking Time:	≥ 0.5 ms
	Back Porch:	≥ 0.4 ms
	Sync Width:	≥ 0.045 ms

- Several items like size, position and distortion can be adjusted through OSD menu, and if you want to keep it, please push the key [1] for memory, or keep the key untouched for about 20 seconds, it is automatically memorized.

  NOTE : In case of RECALL the key is untouched for about 30 seconds, RECALL function will be cancelled.

  Please note, however, that there is the case you can not get the size and/or position you want. (for example, in case Display video Time is too short, you can't get bigger size of the image.)

- The CRT adopted in this CRT display is designed to minimize the moire phenomenon at suitable size for typical display modes. However, there might be a display format among many formats, in which the moire phenomenon appears on this display.

5.5 Signal level and input impedance

5.5.1 Video Signal level

- This CRT display is adjusted at the factory using 0.7V p-p Video Signal, Black level is 0V.
- This CRT display is compatible with 1.0V p-p Video Signal by using Video input level selection.

5.5.2 Sync Signal level

- H/V Separate, H/V Mixed : TTL level
- Sync on Green : 0.3 V p-p ± 0.015 V

5.5.3 Input impedance

- Video input: 75 Ω
- Sync input: ≥ 1 kΩ

5.6 Display performance

5.6.1 Display area

1) PRESET TIMING

MODE 1,
WIDTH : 300 mm ± 5 mm
HEIGHT : 225 mm ± 5 mm

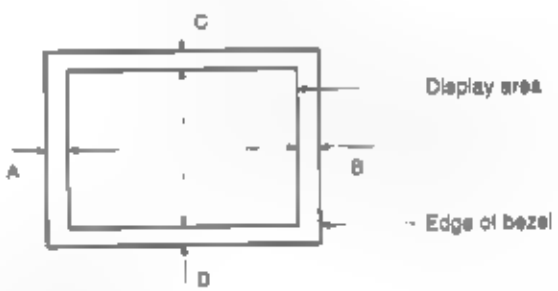
5.6.2 Centering

1) PRESET TIMING (MODE1)

|A – B| ≤ 4 mm
|C – D| ≤ 4 mm

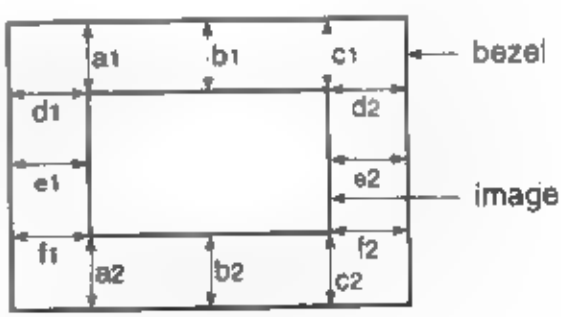
2) RESERVATION TIMING (MODE2–8)

|A – B| ≤ 7 mm
|C – D| ≤ 7 mm



5.6.3 Distortion

|a1 - b1|, |b1 - c1|, |c1 - a1| ≤ 2 mm
|a2 - b2|, |b2 - c2|, |c2 - a2| ≤ 2 mm
|d1 - e1|, |e1 - f1|, |f1 - d1| ≤ 2 mm
|d2 - e2|, |e2 - f2|, |f2 - d2| ≤ 2 mm

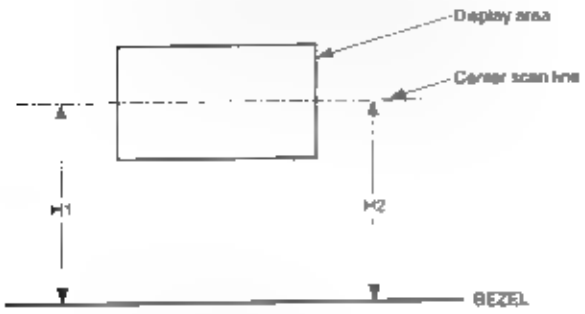


- Test condition: 7 : Standard Condition
- Image Size: 300 x 225 mm
- User control: AS Shipped

5.6.4 Rotation

$|H1 - H2| \leq 2.0$ mm

≤ 0 mm (after user adjustment)



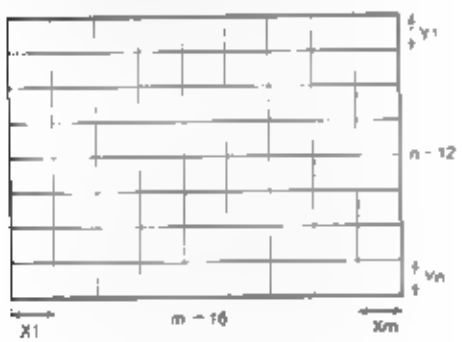
5.6.5 Linearity

Horizontal linearity

$$= \frac{X\,max. - X\,min.}{X\,max. + X\,min.} \times 100\ \% \leq 6\ \%$$

Vertical linearity

$$= \frac{Y\,max. - Y\,min.}{Y\,max. + Y\,min.} \times 100\ \% \leq 5\ \%$$



<Conditions>

Display image ------- crosshatch pattern

Maximum and minimum values should not be adjacent to each other.

X max. is maximum value among X1~Xm

X min. is minimum value among X1~Xm

Y max. is maximum value among Y1~Yn

Y min. is minimum value among Y1~Yn

5.7 General performance

5.7.1 Video output

Bandwidth	135 MHz (Typ.)

5.7.2 Maximum luminance

Value	130 cd/m² (Typ.) for 5% white field at the center of the display area. 110 cd/m² (Typ.) for 100% white field at the center of the display area. Specified by 9300 K + 9 MPCD
Conditions	Display image White full flat field Luminance Max. (Contrast Max.) (Brightness Detent point)

5.7.3 Minimum luminance

Value	≤ 26 cd/m² at the center of the display area. Specified by 9300 K + 9 MPCD
Conditions	Display image : White full flat field Luminance Min. (Contrast Min.) (Brightness : Detent point)

5.7.4 Brightness variation

Value	70 % (Min.) Variation = C/A X 100
Conditions	Display image : White full flat field Luminance MAX (Contrast MAX) (Brightness Detent point) A : Luminance at center position C : Luminance at position of lowest brightness

5.7.5 Display area regulation

	Display area variation	Range of variation
Due to Luminance	within 3 mm	25 ~ 110 cd/m² (white flat field)
Due to Power Supply	within 3 mm	AC : 90-132 V or 180-264 V
Due to Temperature	within 4 mm	0 - 40° C

5.7.6 Color Point

< Conditions >

Display image White flat field at the center of the display area.

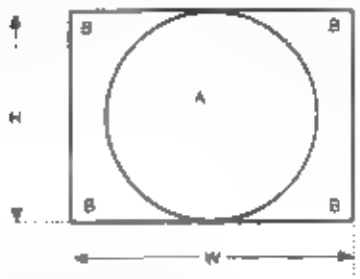
Luminance Brightness Detent point

Contrast	max	min
Value	9300 K + 8 MPCD x = 0.283 ± 0.020 y = 0.298 ± 0.020	9300 K + 8 MPCD x = 0.283 ± 0.020 y = 0.298 ± 0.020

5.7.7 Misconvergence

Center area of display (A) : 0.3 mm (Max.)

Corner area of display (B) : 0.4 mm (Max.)



<Conditions>

Display image : Crosshatch pattern mixed with R, G and B colors

Convergence gauge : KLEIN CM7AG or equivalent

Display area : W x H 300 x 225 mm

5.7.8 Purity

Conspicuous mis-landing shall not be visible within display area at a distance of 60cm from CRT surface.

<Conditions>

Display image : White flat field

Luminance : Contrast max, Brightness Detent point

5.7.9 Jitter

Invisible at a distance of 60 cm from CRT surface.

6. ENVIRONMENTS

6.1 Ambient temperature, humidity and altitude

	Operating	Storage and shipment
Temperature	0 ~ 40° C * (fh = 30.65 kHz)	-20 ~ +60° C (-4 ~ 140° F)
Humidity	5 ~ 90 % *	5 ~ 90 % *
Altitude	3,000 m (Max.) (10,000 ft)	12,000 m (Max.) (40,000 ft)

* Non-condensation

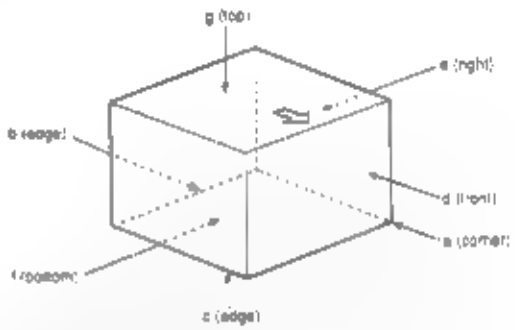
6.2 Vibration and shock

6.2.1 Vibration

	Order of tests	Direction of vibration	Acceleration: Non-operation	Acceleration: Storage and shipment	Frequency	Sweep	Test time
Unpacked	1	Vertical	2.9 m/s² (0.3 G)		5 - 55 Hz	120 s	30 min.
	2	Horizontal: Front to back					15 min.
	3	Horizontal: Right to left					
Packed	1	Vertical		12.3 m/s² (1.25 G)			40 min.
	2	Horizontal: Front to back		7.4 m/s² (0.75 G)	5 - 50 Hz	810 s Logsweep	20 min
	3	Horizontal: Right to left					

6.2.2 Shock (Drop test)

	Order of drop	Face to drop is to face the floor (See the figure)	Height	Number of drop
Unpacked	20 G One time for each face (6 faces) (non-operation)			
Packed	1	a, b, c, d, e, g	60 cm	1 time for each
	2	f	70 cm	



7. REGULATORY STANDARDS

7.1 Safety standards

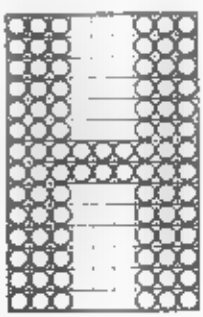
Applicable standards
UL 1950, Listing
CSA 22.2 No. 950, Products Certification
TÜV (IEC-950)/GS (ZH1)
DHHS 21 CFR subchapter J, X-Ray Radiation
PTB, X-Ray Radiation, Approval
HWC
NORDIC
Energy Star

7.2 EMC standards

Designed to meet following standards
VCCI class II
FCC: FCC part 15, subpart B, class B
VDE 0878/06.83
Vfg 243/1991
CISPR22 class B
MPR-II Radiation
TCO'92 Radiation

<EMI test pattern>

White full "H" characters (9 x 14 dots) block (12 x 24 dots) "H" character font is as follows



8. POWER CORD

- •Northern Hemisphere Version (North America and Japan) ··· UL,CSA approved power cord (Na Type)
- •European Version ··· VDE approved power cord (IPC Type)
- •Australia, NewZealand Version ··· None

9. SIGNAL CABLE

Signal cable with Mini D-Sub 15P connectors at both end is put in package

Length : 1.5 meter (4.93 feet)

10. RELIABILITY

>55,000hrs (demonstrated MTBF)

11. COLOR CRT DEFECTIVE STANDARD

11.1 Specification of screen blemishes

This instruction is applied to inspection of the screen faults and of the glass quality of the faceplate

11.2 Test procedure

11.2.1 Tests are to be done under the following two conditions

(a) With a clanked white raster at 80 μA

(b) With incident light (white light of 700 - 1000 lux at the center of the screen tube is not operated)

11.2.2 Viewing distance should be 60 cm minimum Faults not visible at this viewing distance are permitted

11.2.3 The Following quality areas are specified

Zone A. Rectangular area (sides X and Y) of which the point of intersection of the diagonals coincides with the mechanical center of the screen

Zone B: The remaining screen area except zone A

Specified zone is applied to glass faceplate defects

	Screen size	
	X	Y
Zone A	320mm (12.6")	240mm (9.45")

11.2.4 Remarks concerning faults:

a) Unless otherwise specified, the size of a fault is the smallest value found with one of the two formulas

$$\frac{a+c}{a}, \quad \frac{a}{20} + 2b \quad (a = \text{length}, c = \text{width})$$

b) For entirely or partially missing and/or non-fluorescent phosphor dots refer to the following definitions:

Entire defect: Remaining part is not more than 50% of the complete dot.

Partical defect: Remaining part is between 50% and 75% of the complete dot

11.3 Permissible limit

11.3.1 Screen faults

Missing phosphor dots, black spots, filled mask holes and copper stains

Size of defects			Max. permissible number	Min. permissible distance between defects	Max. permissible number in circle of ϕ 50 mm
Entire defects	A	A1 3 adjacent dots or more	0	—	—
		A2 3 adjacent same color dots or more	1		
		A3 More than 6 adjacent dots	0		
	B	B1 2 adjacent dots	0		
		B2 4 or 5 adjacent dots	0		
		B3 2 adjacent same color dots	1		
	C	C1 1 dot	1	20 mm	—
		C2 2 adjacent different color dots	2		
		C3 1 dot	7		
	B + C		—	20 mm	—
Partial defects	D	Partial defects	—	—	5
Total pieces of defects excluding partial defects			7	—	—

— Entire defects having separation less than min. permissible distance are defined as an adjacent defects.

— Defects of remaining part more than 75% is ignored, except for concentration having diameter more than ϕ 5 mm

11.3.2 Glass faceplate defects

(A) Air bubbles, open bubbles, stones and elongated air bubbles

Area			Zone A	Zone B
Permissible major defects	Air Bubble (average dia.)		0.51 – 0.70 mm	0.51 - 0.70 mm
	Spot and open air bubble (average dia.)		0.41 - 0.60 mm	0.41 – 0.60 mm
	Maximum Permissible number	Each zone	1	1
		Total	2	
	Minimum allowable distance among defects		57 mm	
Permissible defects within any 50 mm-dia.-circle	Air Bubble (average dia.)		0.25 – 0.50 mm	
	Spot and open air bubble (average dia.)		0.20 - 0.40 mm	
	Max. permissible number		2	
	△ Minimum allowable distance among defects		12.7 mm	
△△ Elongated air bubble (permissible size)		Width	0.10 - 0.20 mm	0.10 - 0.30 mm
		Length	4.0mm	6.0 mm

△ This is also applied to the distance to major defects.

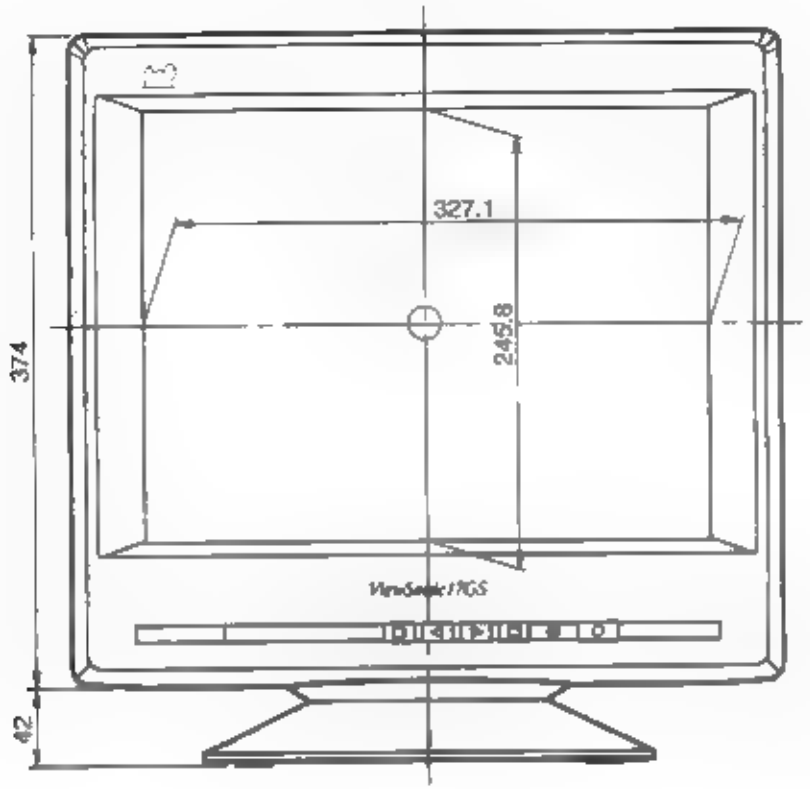
△△ This should be evaluated by its average diameter and then relevant standards of air bubble are applied except number of defects for each zone, minimum distance among defects and maximum limit of average diameter.

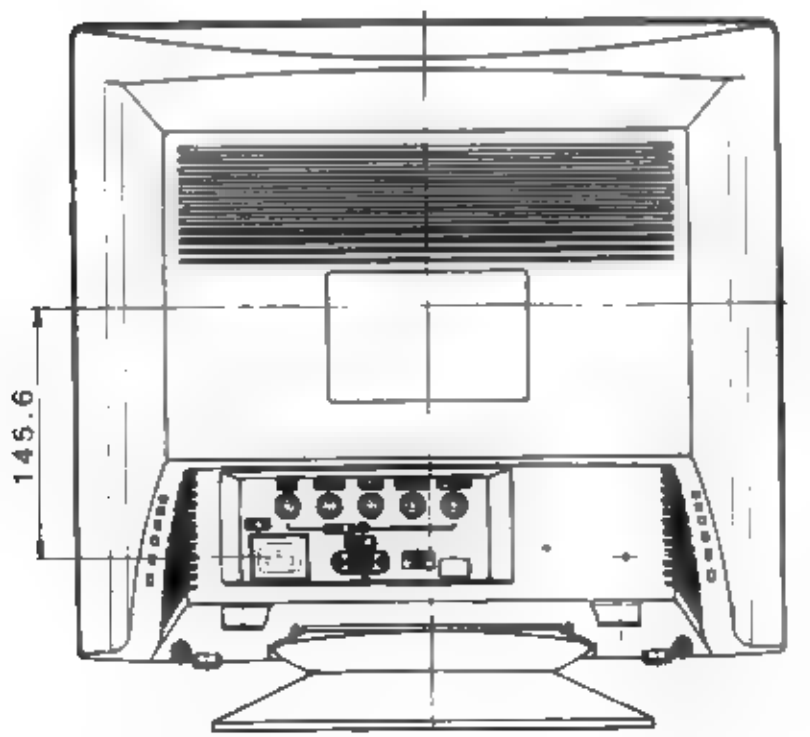
(B) Scratches

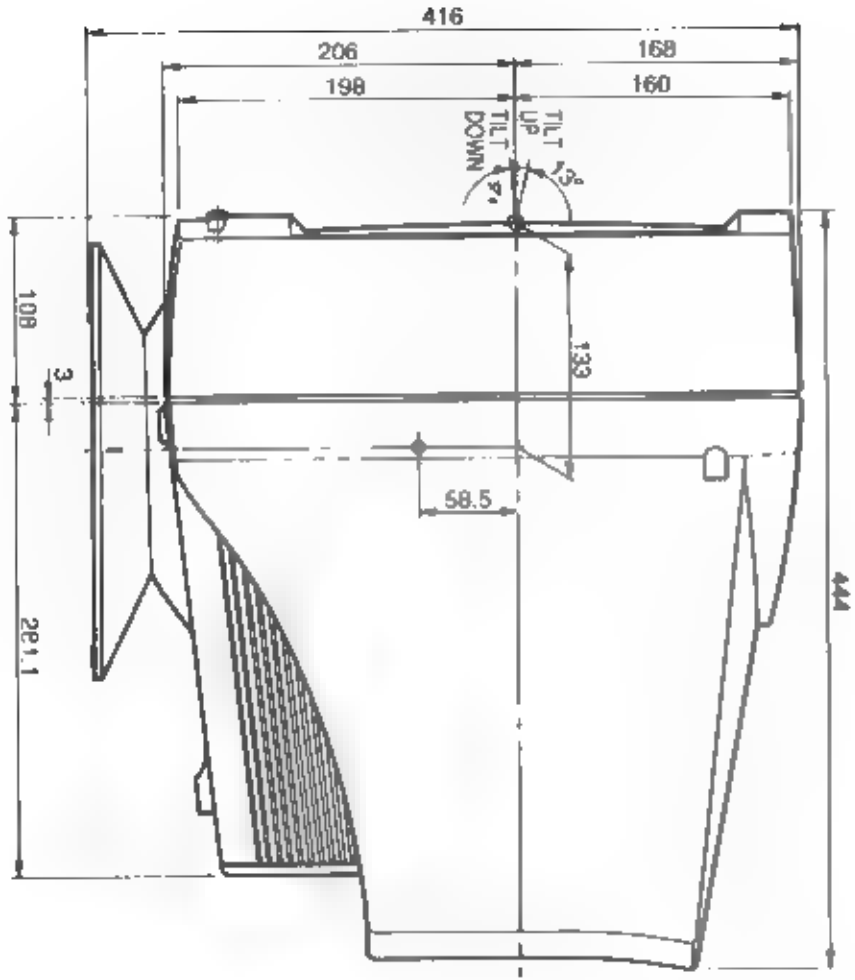
Width (mm)	Maximum allowable length (mm)
< 0.05	permitted
0.05 - 0.10	25.4
0.11 - 0.15	12.7
> 0.15	rejected

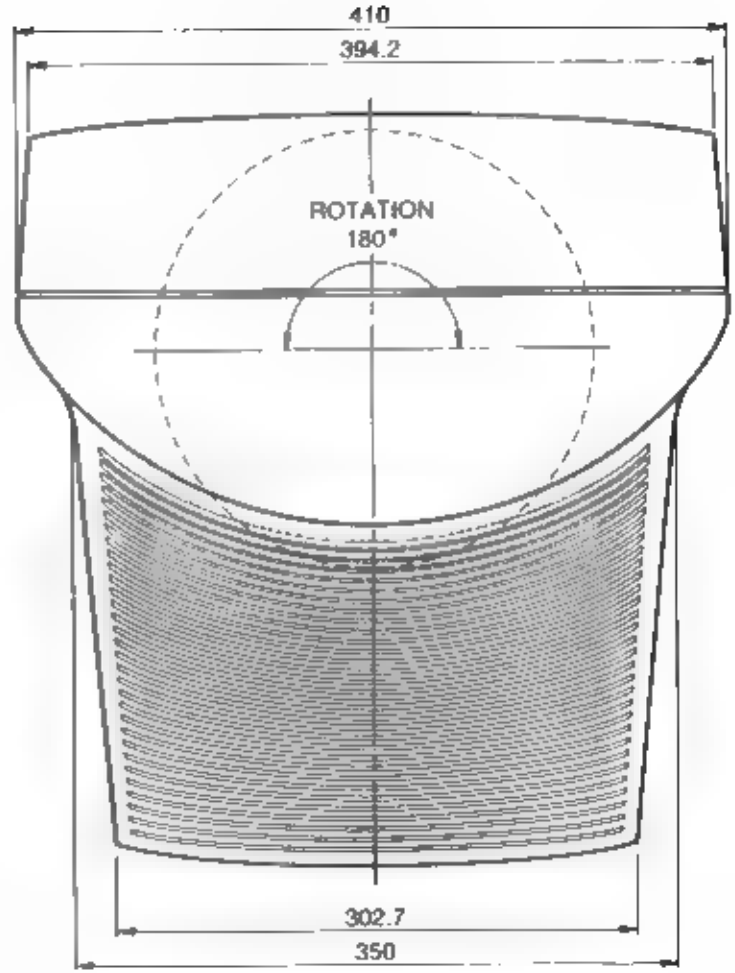
(C) Other defects not stated above such as chips, cracks, bruises, shear marks, clouds and polished patterns are not allowed when they substantially spoil appearance, viewed from the viewing distance.

DIMENSIONS






416
206
168
198
160
TILT DOWN 4°
TILT UP 13°
108
3
211.1
133
58.5
444

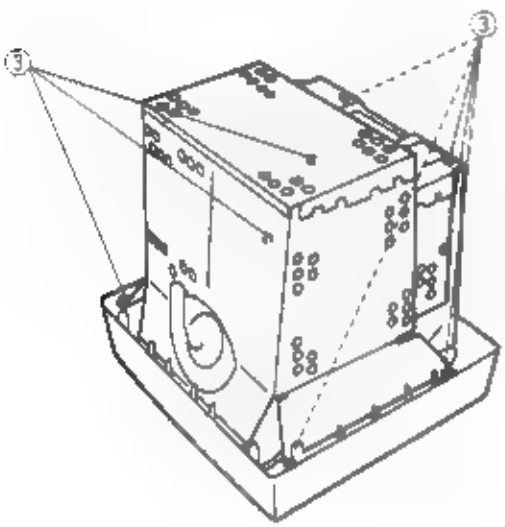

410
394.2
ROTATION 180°
302.7
350

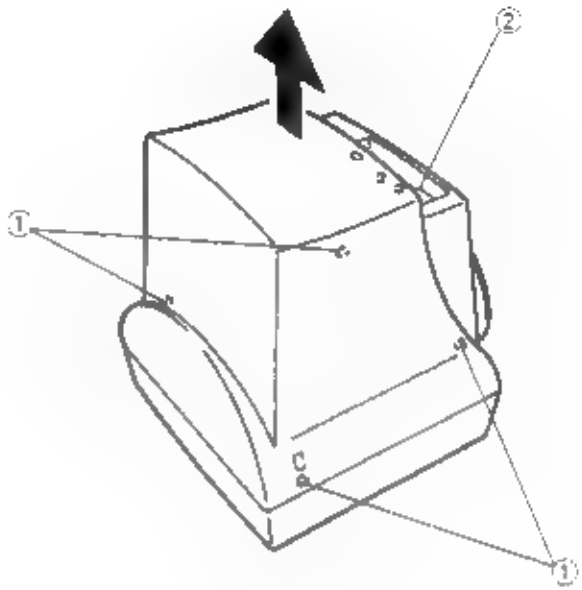
DISASSEMBLY INSTRUCTIONS

1. Rear cover removal

Note: Spread a mat underneath to avoid damaging the CRT surface.

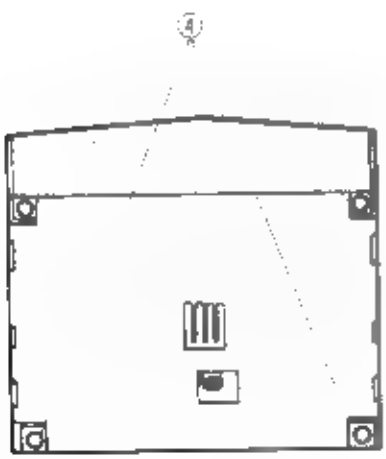
1) Remove four large screws ① and small screw ② from the rear cover.
2) Remove the cover.
3) Remove eight screws ③ from the shield case.
4) Remove the shield case.



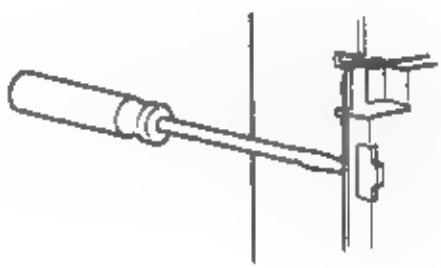


2. Video PCB removal

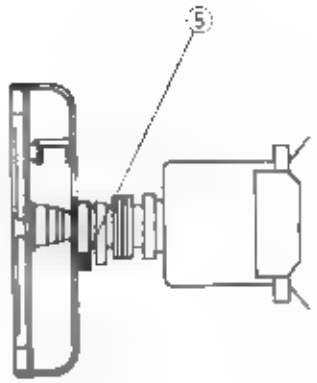
1) Remove four screws ④ securing the shield cover.
2) Desolder (B) and Remove the shield cover (A)

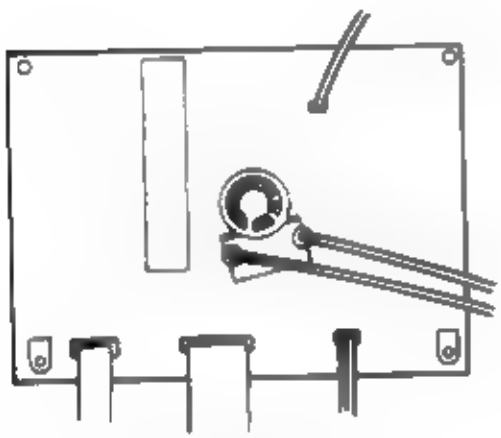


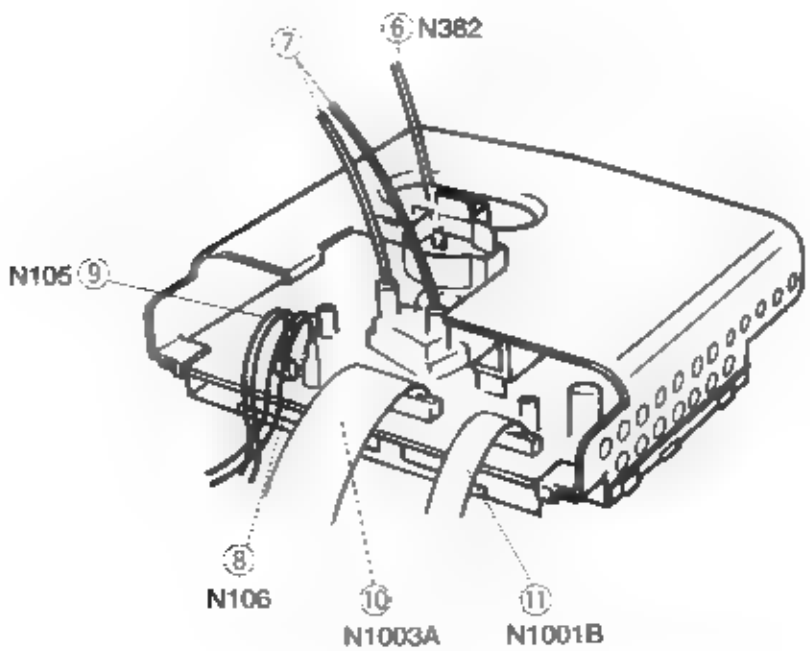
(A)



3) Loosen the screw ⑤ securing the CRT neck and the shield case.
4) Remove the PCB block from the CRT.
5) Remove the N382 connector ⑥.
6) Remove two focus leads ⑦.
7) Remove ground connector ⑧ (N106) connected to the PCB.
8) Remove N105 connector ⑨.
9) Remove N1003A connector ⑩.
10) Remove N1001B connector ⑪.
11) Remove the PCB from the shield case.

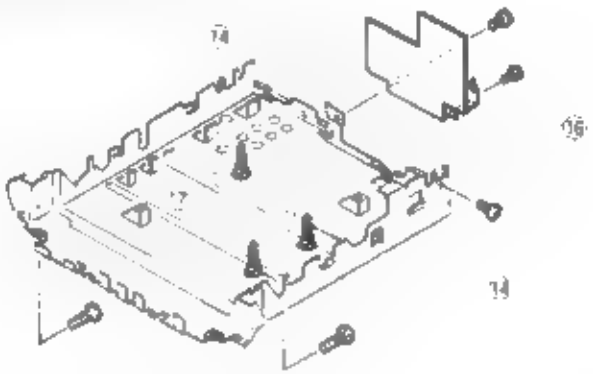


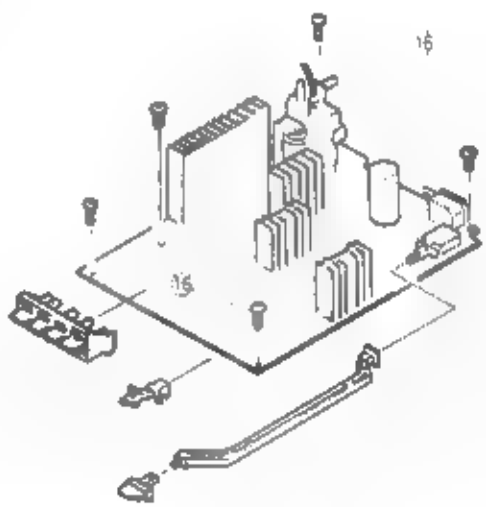


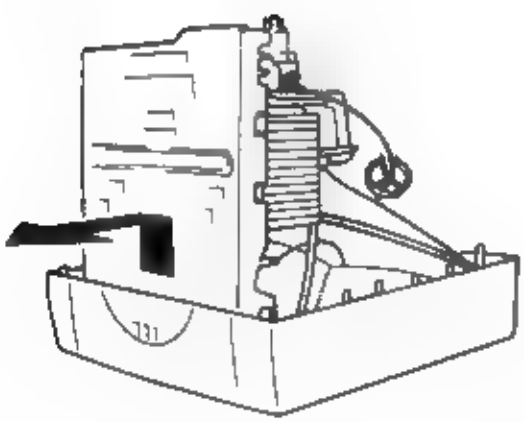


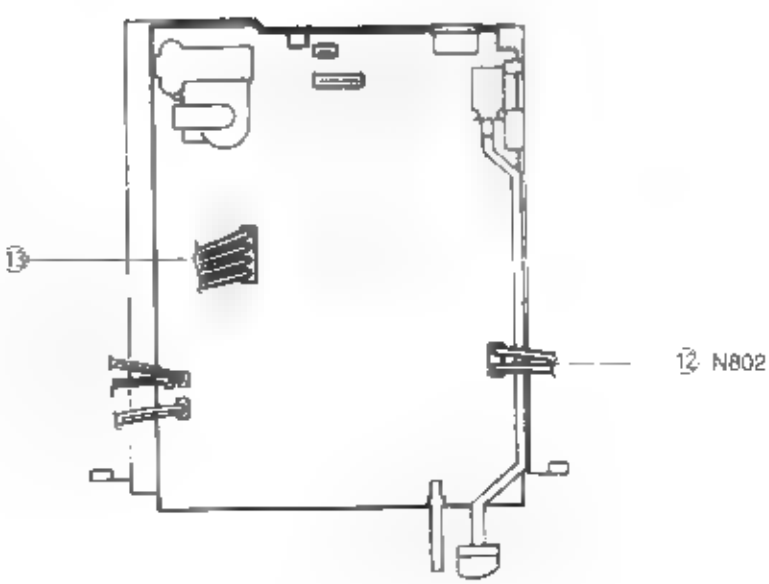
3. Main PCB Removal

1) Remove the connector ⑫ (N802) of the degauss coil
2) Remove the DY connector ⑬
3) Remove the anode cap
4) Remove two ground connector ⑭
5) Move the CRT face down and remove two screws ⑮ securing the bottom fitting metal
6) Remove the fitting metal and the PCB from the cabinet
7) Remove ten screws ⑯ securing the fitting metal and PCB
8) Remove there clamper ⑰ the fitting metal and PCB
9) Remove the PCB ⑱ with the figure referenced



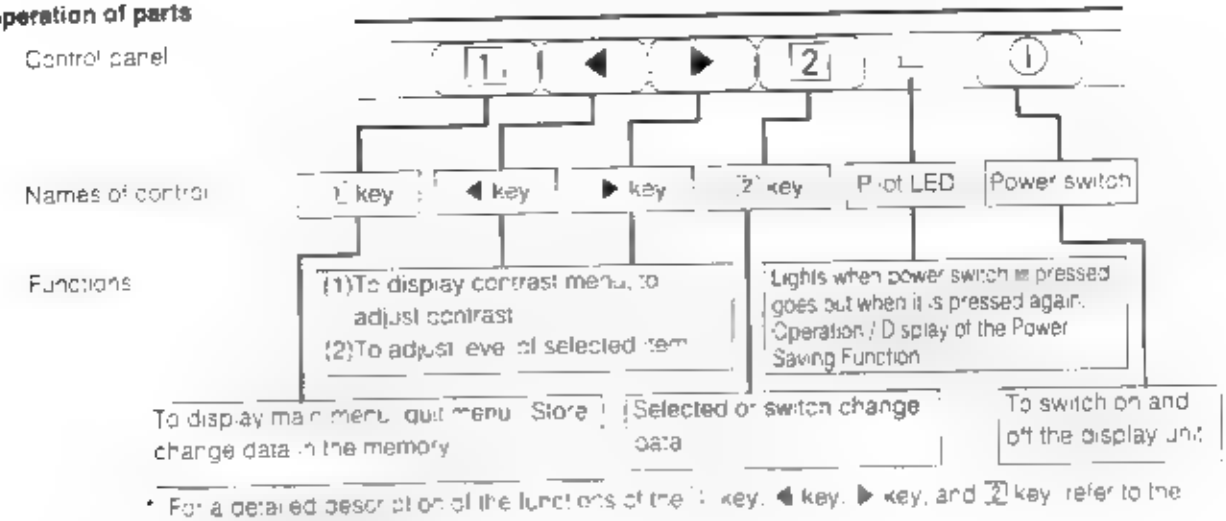






CONTROL LOCATION

Basic operation of parts



* For a detailed description of the functions of the 1 key, ◀ key, ▶ key, and 2 key, refer to the next section onward.

Examples of on-screen operation

A. Contrast adjustment

Display changes

Steps of operation

1. Display the contrast adjustment menu using the ◀ key or ▶ key

2. Set the desired state using the ◀ key or ▶ key. If the 1 key is pressed, the set data is stored in the memory and the menu screen is cleared.

On-screen display changes

< Contrast menu >

B. H. size adjustment

Display changes

Steps of operation

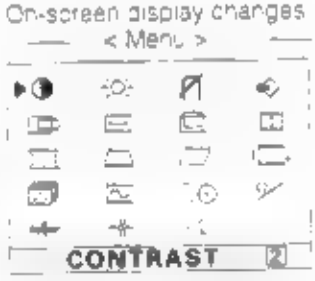
1. Call the main menu on the screen by pressing the 1 key.

2. Move to cursor to H. SIZE using the ◀ key or ▶ key, then press the 2 key to select.

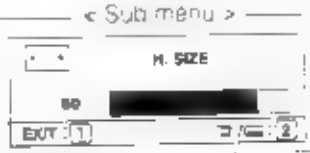
3. Set the desired state using the ◀ key or ▶ key. If the 1 (EXIT) key is pressed, the set data is stored in the memory and the menu screen is cleared.

On-screen display changes

< Menu >



< Sub menu >



Main menu

CAUTION FOR ADJUSTMENT AND REPAIR

1. Degaussing is inevitably required at purity adjustment or convergence adjustment.
2. If you check or adjust electrical specification or function, more than 20 minutes burn in is required.
3. Reforming of the lead wire is required after your repair work.
4. Prior to starting work, be sure to check that the input signal is at the specified timing and that the polarity is as specified in all modes.
5. Brightness control: After mounting the rear cover, brightness tends to decrease about 5 cd/m² on a flat white field and about 1 cd/m² on a white raster field. This should be taken into consideration.
6. Brightness stabilizing time: It takes about 20 to 50 seconds for the brightness to stabilize after turning the power off for 5 seconds (AC). Therefore, care should be taken to this.
7. Aging should be made in white raster of 30 ~ 50 cd/m² and raster size, 320 x 240 mm before adjusting the ITC.

■ Set the CONTRAST to MAX and BRIGHTNESS to CENTER using the O.S.D.

CAUTION FOR SERVICING

When servicing or replacing the CRT, high voltage sometimes remains on the anode. So, completely discharge high voltage before servicing or replacing the CRT so as to prevent a shock to the service person.

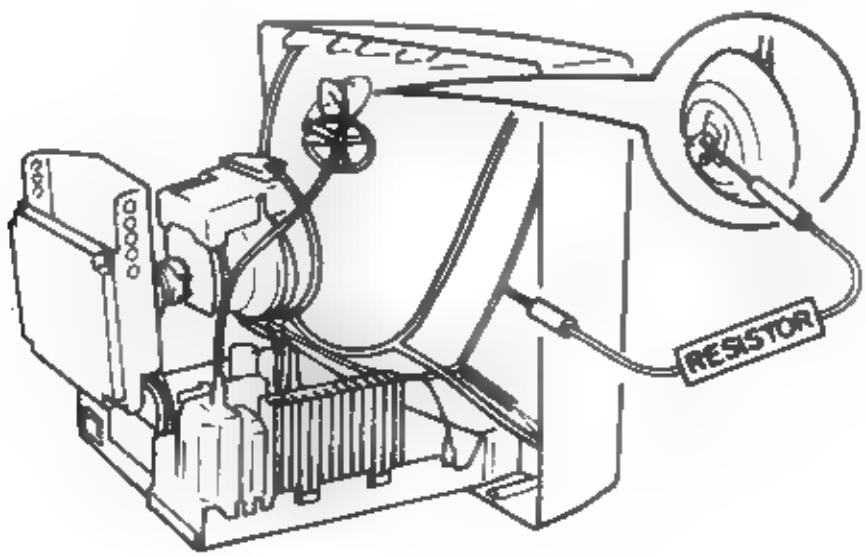
CRT Anode Discharge

1. When you check the CRT anode or replace the CRT, discharge the CRT anode to the external conductive coating (aquadag) of CRT, especially when checked right after power turn-off.
2. Ground one end of a jumper wire which has a resistor (30 kV < resisting pressure 100 MΩ) and connect the other point to the CRT anode.

Note: Grounding must be done first.

This model has a section that does not share a common ground with the power supply section. The different sections are referred to as the HOT section and the COLD section in the precautions below.

- Do not touch the HOT section and the COLD section at the same time. You may be hit by an electric shock.
2. Do not short the HOT section to the COLD section. This could blow the fuse or damage parts.
3. Never measure the HOT section and the COLD section at the same time when using tools such as oscilloscopes or multimeters.
4. Always unplug the unit before beginning any operation such as removing the chassis.



ADJUSTMENT AND CHECK PROCEDURE

INTRODUCTION

- This monitor is controlled by a microcomputer. With the exception of purity/convergence/focus all is digitally adjusted.
  Therefore a computer, the dedicated control software, the dedicated interface, a 9~12 V power supply, and a signal generator are required servicing.

TOOLS REQUIRED

- **Computer**
  The control software is IBM PC compatible only. Therefore, it is not compatible with any other operating systems. For further information please contact **our sales office.**

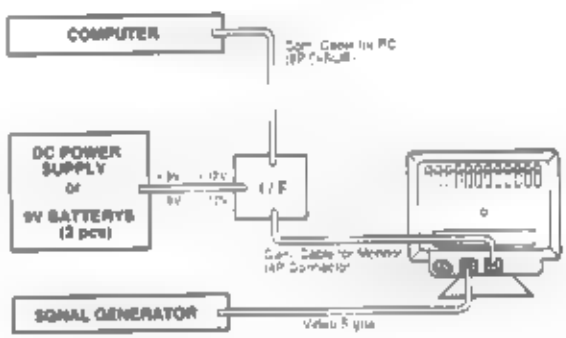
- **Control Software**
  The HV8 chassis can only use "1786PS adjustment program disk". No other program can access the EEPROM on the monitor. For further information please contact **our sales office.**

- **Interface**
  The interface is dedicated to work only with the control software and the our chassis. There are no substitutes for this interface. For further information please contact **our sales office.**

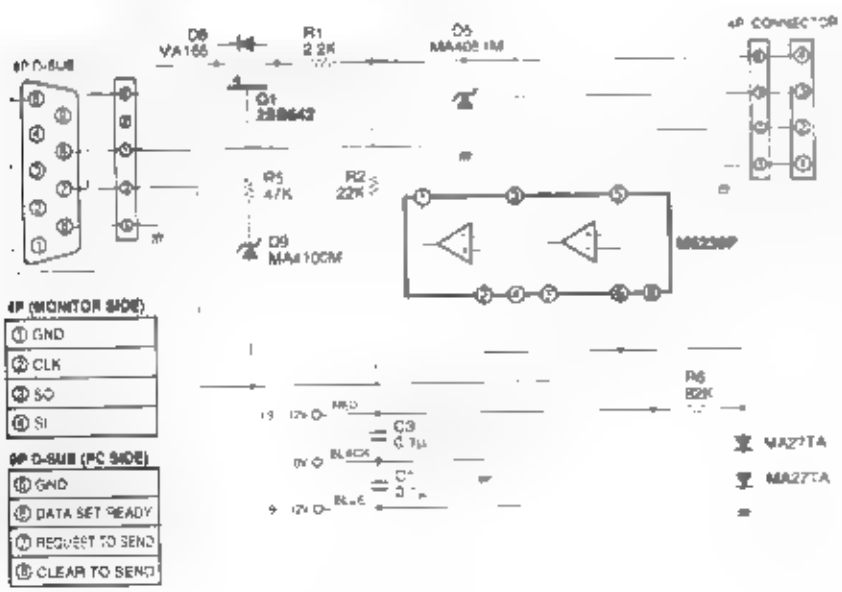
- **Power Supply**
  A DC 9~12 V (+9~12 V/-9~12 V) power supply is required for operating the interface.

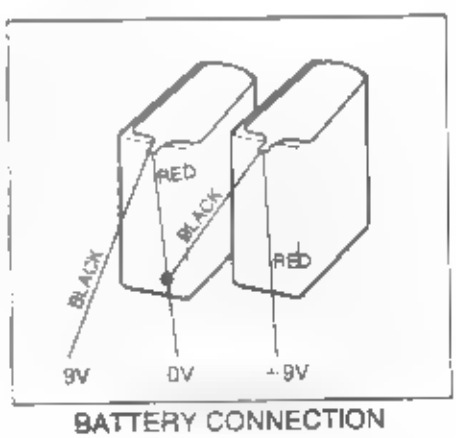
- **Signal Generator**
  It is necessary for you to use a signal generator which operates on fH 96 kHz, fv 160 Hz, and fc 135 MHz bands.

INTERFACE CONNECTION



INTERFACE SCHEMATIC DIAGRAM





BATTERY CONNECTION

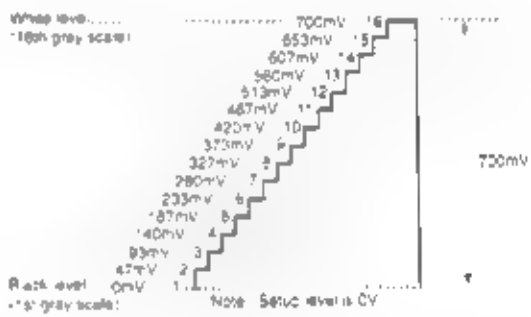
OTHER TOOLS

- Oscilloscope (dual trace)
- Scope probe Attenuation 100:1
  Attenuation 10:1
- Digital Voltmeter Range 0 to 1000 V DC
  Accuracy 0.1 %
- TV color Analyzer II – that reads luminance and chromaticity X and Y coordinates
- Digital High Voltmeter
- AC power supply Output voltage : 0 to 300 V
- Degaussing coil
- Convergence meter
- Scale
- Double-faced scale
- Microscope Scale factor 50
- White racquer (Paint)

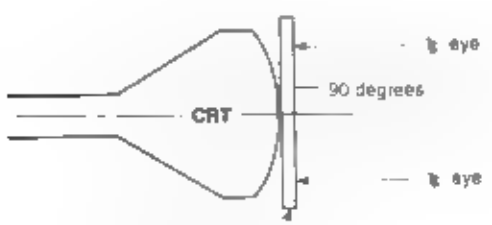
STANDARD CONDITION OF ADJUSTMENT PROCEDURE

• Signal timing :	Standard timing 1024 x 768 (See page 5)
• Display pattern	White, full "H" character
• Signal level	V/H TTL level video: 700 mV
• Input source :	AC 120 V, 60 Hz
• Ambient temperature :	Room temperature
• Warm-up time :	More than 30 minutes
• Brightness control	Center
• Contrast control :	Max
• Magnetic field	Vertical 40 μT Horizontal 0 μT
• Signal cable :	Attached

Video input signal from PC



- Use a Helmholtz device to adjust an unit with no horizontal magnetic field and a vertical field of 40 μT Inspect the unit under the same conditions
- The ambient illuminance must be 200 lux.
- Use an external degaussing coil any time the DEGAUSS switch does not remove color shading.
- To check the image width, height, linearity and distortion proceed as below



double-faced scale

Measure level with respect to tube axis.

ADJUSTMENT SOFTWARE

1. Software operating procedure

A) Power on the computer

B) Connect the Communication cable for monitor adjustment

C) Insert the adjustment disk into the drive

D) At the A:> prompt type "VSR" then press [ENTER]

> A function to identify the connected monitor is provided to prevent accidents due to erroneous use of the HV8 chassis program. If this program is used for any monitor other than the HV8, the message reading "This monitor is not an HV8 chassis. All further activity has been prevented" is displayed and the operation is stopped.

E) Refer to the adjustment procedures.

2. Adjustment Program

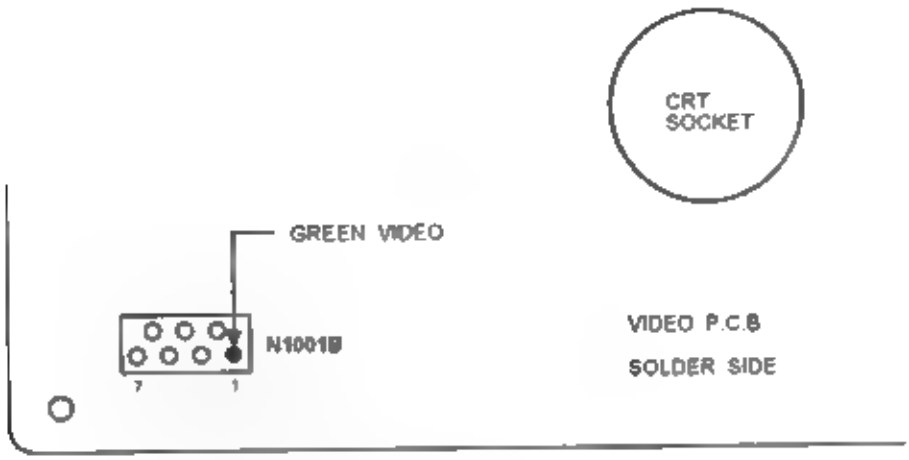
Main Menu of Adjustment Program

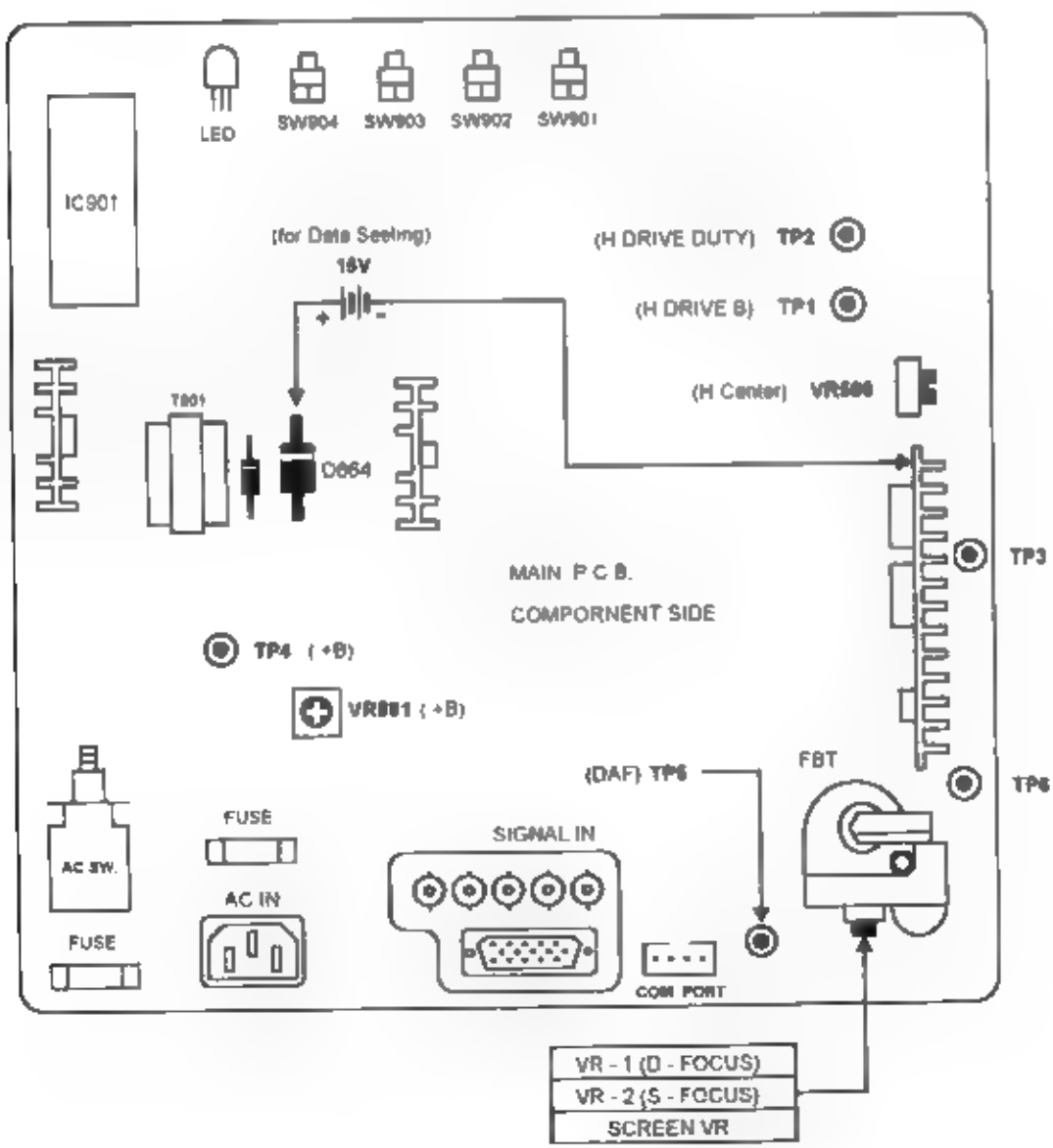
```
<<HV8 ADJUST PROGRAM MAIN MENU>>  (Text)        <Ver 1.0>
   1) Load data from FILE          6) Clear User preset
   2) Adjust H. OSC Freerun        7) Save data to FILE
   3) Adjust VSR setting           8) Special ADJUST
   4) Adjust OTHER setting         9) Information Service
   5) Adjust Factory preset       10) Show Version & Error
```

Description of Function of Each Menu

1) **Load Data from File**
   This transfers the data file from the disk to the EEPROM on the monitor.
2) **Adjust H. OSC Freerun**
   To guarantee that the full range of horizontal frequencies operate correctly. The reference oscillation frequency should be set.
3) **Adjust VSR Setting**
   To guarantee that the full range of horizontal frequencies operate correctly. The reference voltage and the distortion offset data should be set.
4) **Adjust Other Setting**
   This is used to control the brightness and color.
5) **Adjust Factory Preset**
   Makes adjustments to the factory presets. This data is also referenced when in modes other than the preset mode.
6) **Clear User Preset**
   Clear the data written in the user preset domain. There is no data in the user presets when the product shipped from the factory.
7) **Save Data to File**
   Transfers the data from the EEPROM on the monitor to a data file on a floppy disk or hard drive. The data file can be named anything as long as it is less than 8 characters long.
8) **Special Asjust**
   This menu has the following functions.
   - Related data is automatically set on the basis of adjustment results to save the time for adjustment.
     (Example: Color adjustment applies only to the 9300 K, while 6550 K and user color data are automatically set.)
9) **Information Service**
   Displays the H/V frequencies that is being supplied to the monitor and gives the operational status of the monitor.
10) **Show Version and Error**
    Shows the version of the microprocessor that is in the monitor. Also, if there is an error in the operation of the monitor.
    The error is displayed on the screen of the PC.

SERVICE ADJUSTMENT CONTROL LOCATION





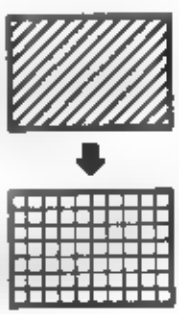
REQUIRED ADJUSTMENT PROCEDURE AFTER A PARTS IS REPLACED (✓ IS REQUIRED)

	ADJUSTMENT ITEM	REPLACED PARTS																
		MAIN P.C.B	VIDEO P.C.B	CRT DY	IC1302 IC1303 IC1307 IC1401	IC901	IC821 Q821	IC490	IC501	IC550	Q549 Q719 Q550 Q855	FBT Q680 Q690						
A	DATA SETTING *	✓				✓												
B	+B ADJUST	✓				✓	✓											
C	H. FREE RUN	✓				✓			✓									
D	H. DRIVE DUTY	✓				✓			✓									
E	H. DRIVE +B	✓				✓				✓								
F	EHT	✓		✓		✓						✓						
G	H. CENTER	✓		✓		✓						✓						
H	V. SIZE / POSI DISTORTION	✓		✓		✓		✓	✓	✓	✓	✓						
I	H. SIZE / POSI DISTORTION	✓		✓		✓		✓	✓	✓	✓	✓						
J	PRESET	✓		✓		✓		✓	✓	✓	✓	✓						
K	DAF	✓				✓												
L	FOCUS	✓		✓		✓						✓						
M	CUT-OFF & BRIGHTNESS	✓	✓	✓	✓	✓						✓						
N	FINAL TUNE	✓	✓	✓	✓	✓						✓						
O	DATA SAVING	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
	PURITY & CONVERGENCE			✓														
	SCREEN CHECK	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						

*** DATA SETTING : Do not load standard data except when main PCB and IC901are replaced.**

ADJUSTMENT PROCEDURE

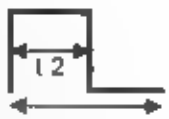
1. Description of Adjustment Method

	Program Menu Item	♦ Test Meter ⇓ Test Point ▯ Pattern	JOB CODE	Input Signal	Operation	Adjusting Value
A	**STANDARD DATA SETTING** 1) Load data from FILE	⇓ D864 - GND Refer to service adjustment control location for connect point	A1 A2 A3 A4 AE		Do not connect the power and signal cable to monitor Apply 15V to D864 CATHODE and GND (Do not apply 5V to IC901. Because IC833 will supply the 5V and RESET signal to IC901) Set the cell to the menu at left and press [↵] A massage **FILE -> EEPROM FILE NAME (q or Q escape) [ ] :** ■ displayed So key in the DACDATA DAT (when using the standard data) and press [↵] Disconnect 15V cable, then turn on the power switch of the monitor	
	Do not load standard data except when Main P.C.B. and IC901 are replaced.					
B	**+B ADJUST**	♦ Digital voltmeter ⇓ TP4 - GND ▯ RGB OFF (SYNC ONLY)	B1 B2	HV8-1	Check that the input signal to the monitor is [fH 29.5kHz] and [fV 48.0Hz] Make the adjustment to the value shown ■ right by turning the **VR861** on the main PCB	82V +0.5 -1.0
C	**H. FREE RUN** 2) Adjust H. OSC freerun	▯ Crosshatch	C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 CE	HV8-1 HV8-2 HV8-4 HV8-6	Set the cell to the menu at left and press [↵] Set the cell to the adjusting mode INTP [0] and press [↵] Check that the input signal to the monitor is [fH 29.5kHz] and [fV 48.0Hz] and press [↵]. When the screen image has stabilized, press [↵] ■ return to menu of **C2** Input signal [fH 39.0kHz] and [fV 77.1Hz] Select Adjusting mode INTP [1], and repeat above procedure Input signal [fH 64.5kHz] and [fV 105.0Hz] Select Adjusting mode INTP [2], and repeat above procedure. Input signal [fH 86.0kHz] and [fV 165.1Hz] Select Adjusting mode INTP [3], and repeat above procedure Press [E] to return to main menu.	

Note 1 : Check to be sure that the program disk name is **1786PS** before making necessary adjustment.

Note ■ : Unless otherwise specified, the monitor state is as given at right.

Note 3 : The underlined places indicate the adjustment items on the screen of the PC.

	Program Menu Item	• Test Meter ψ Test Point 		Pattern	JOB CODE	Input Signal	Operation	Adjusting Value
D	H. DRIVE DUTY 3) Adjust VSR setting	• Oscilloscope ψ TP2 - GND 		Crosshatch Oscilloscope Range HV8-1 10μs/div HV8-2 5μs/div HV8-4 5μs/div HV8-6 2μs/div	D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 D12 DE	 HV8-1 HV8-2 HV8-4 HV8-6 	Set the cell ■ the menu at left and press [↵] Set the cell to the adjusting mode INTP [0] and press [↵] Check that the input signal to the monitor is [fH 29.5kHz] and [fV 48.0Hz] and press [↵] Set the cell to H. DRIVE DUTY and press [↵] Make the adjustment to the value shown at right by using [←] and [→] Register by pressing [↵] and return to menu of D2 by pressing [E]. Input signal [fH 39.0kHz] and [fV 77.1Hz] Select Adjusting mode INTP [1], and repeat above procedure Input signal [fH 64.5kHz] and [fV 105.0Hz] Select Adjusting mode INTP [2], and repeat above procedure Input signal [fH 86.0kHz] and [fV 165.1Hz] Select Adjusting mode INTP [3], and repeat above procedure Press [E] to return to main menu.	 t2 ÷ t1 × 100 = 52% ±2.5% 51% ±2.5% 47% ±2.5% 42% ±2.5%
E	H. DRIVE +B 3) Adjust VSR setting	• Digital voltmeter ψ TP1 - GND 		Crosshatch	E1 ■ E3 E4 ■ E6 E7 E8 ■ E10 E11 E12 EE	 HV8-1 HV8-2 HV8-4 HV8-6 	Set the cell to the menu at left and press [↵]. Set the cell to the adjusting mode INTP [0] and press [↵] Check that the input signal to the monitor is [fH 29.5kHz] and [fV 48.0Hz] and press [↵] Set the cell to H. DRIVE +B and press [↵] Make the adjustment to the value shown at right by using [←] and [→] Register by press [↵] and return to menu of E2 by press [E] Input signal [fH 39.0kHz] and [fV 77.1Hz] Select Adjusting mode INTP [1], and repeat above procedure. Input signal [fH 64.5kHz] and [fV 105.0Hz] Select Adjusting mode INTP [2], and repeat above procedure. Input signal [fH 86.0kHz] and [fV 165.1Hz] Select Adjusting mode INTP [3], and repeat above procedure. Press ■ to return to main menu	21.0V ±0.3V 19.5V ±0.3V 17.0V ±0.3V 14.5V ±0.3V

	Program Menu Item	• Test Meter ⇩ Test Point ·· Pattern	JOB CODE	Input Signal	Operation	Adjusting Value
F	**EHT ADJUST** 4) Adjust OTHER setting	• Digital voltmeter • High Voltage Probe - Anode Cap - GND ·· RGB off (Sync only)	F1 F2 F3 F4 F5 F6 F7 FE	HV8-6	Turn the power switch of the monitor OFF Connect high voltage probe to Anode Cap and GND Turn the power switch of the monitor ON Set the cell to the menu at left and press [↵] Check that the input signal to the monitor is [fH 86.0kHz] and [fV 165.1Hz] Set the cell to EHT and press [↵] Make the adjustment to the value shown at right by using [←] and [→] Register by press [↵] after adjustment and return to main menu by press [E]	25.0kV ±0.3kV
G	**H. CENTER**	·· RGB off (Sync only)	G1 G2 G3	HV8-6	Set the Brightness to MAX on the OSD Check that the input signal to the monitor is [fH 86.0kHz] and [fV 165.1Hz] Make the adjustment as shown at right by turning the **VR580** on the main PCB	A A=B B Back raster Set the raster to the center with respect to the bezel
H	**V. SIZE / POSI and DISTORTION** 5) Adjust OTHER setting	Crosshatch	H1 H2 H3 HE	Mode-1	Set the cell to the menu at left and press [↵] Check that the input signal to the monitor is [fH 60.0kHz] and [fV 75.0Hz] and press [↵] Set the cell to following items, press [↵] and make the adjustment to the value shown at right by using [←] and [→] ·1· • H. SIZE ·6· V. PCC BARANCE ·2· • H. POSITION ·7· PARALLELOGRAM ·3· V. SIZE ·8· TRAPEZOID ·4· V. POSITION ·9· V. LIN (C) ·5· • V. PCC ■ SIZE, H. POSI and V. PCC is dose not register to interpolation data After adjustment, return to the main menu by using [E]	H 300mm ±5 V 225mm ±5 H/V Posi. Center V PCC Best point
I	**■. SIZE / POSI. V. PCC and V.LIN** 3) Adjust VSR Setting	·· Crosshatch	I1 I2 I3 I4	HV8-1	Set the cell to the menu at left and press [↵] Set the cell to the adjusting mode INTP [0] and press [↵] Check that the input signal to the monitor is [fH 29.5kHz] and [fV 48.0Hz] and press [↵] Set the cell to following items, press [↵] and make the adjustment to the value shown at right by using [←] and [→] ·1· H. SIZE ·4· V. PCC CORNER ·2· H. POSI ·5· V. LIN (S) ·3· V. PCC **- To be continued -**	H : 300mm ±5 V : 225mm ±5 H/V Posi Center V PCC V. LIN Best point

	Program Menu Item	• Test Meter ⇓ Test Point ▮▮ Pattern	JOB CODE	Input Signal	Operation	Adjusting Value
I	**H. SIZE / POSI.** **V. PCC and V.LIN** 3) Adjust VSR Setting	▮▮ Crosshatch	I5 I6 I7 I8 I9 I10 I11 IE	 HV8-2 HV8-4 HV8-6	After adjusting the above, return to menu of **I2** by using [E] Input signal [fH 39.0kHz] and [fV 77.1Hz] Select Adjusting mode INTP [1], and repeat above (**I4~I5**) procedure Input signal [fH 64.5kHz] and [fV 105.0Hz] Select Adjusting mode INTP [2], and repeat above procedure Input signal [fH 86.0kHz] and [fV 165.1Hz] Select Adjusting mode INTP [3], and repeat above procedure. After adjustment, return ■ the main menu by press [E]	H : 300mm ±5 V : 225mm ±5 H/V Posi. Center V. PCC V. LIN Best point
J	**PRESET ADJUST** 4) Adjust Factory preset	▮▮ Crosshatch	J1 J2 J3 J4 JE	 Mode-1 M2~M8 	Set the cell to the menu at left and press [↵]. Check that the input signal to the monitor is [fH 60.0kHz] and [fV 75.0Hz] and press [↵] Set the cell to following items, press [↵] and make the adjustment to the value shown at right by using [←] and [→] ① H. SIZE ⑤ V. PCC ② H. POSI ⑥ PARALLEL ③ V. SIZE ⑦ TRAPEZOID ④ V. POSI Make above adjustment when out of adjusting value by changing input signal to Mode-2~8 and check screen image. After adjustment, return to the main menu by using [E] and [N].	Mode-1 H : 300mm ±5 V : 225mm ±5 Mode-2~7 H 300mm ±7 V 225mm ±7 Mode-8 H 286mm ±7 V 229mm ±7 H/V Posi Center V. PCC Best point
K	**DAF ADJUST** 8) Special ADJUST Oscilloscope Range 2μs/div	▮▮ White flat field • Oscilloscope ⇓ TP5~GND 100:1 probe ⇓ N1001B(2) ~ GND 10:1 probe	K1 K2 K3 K4 KE	 HV8-4	Set the cell ■ the menu at left and press [↵] Select the 3. ADJUST H DAF GAIN Check that the input signal to the monitor is [fH 64.5KHz] and [fV 105.0Hz]. Adjust as shown at right by using [←] and [→] Press [E] to return to menu of **K2** and return to main menu by press [E] [↵].	 380V ±10V Refer to **Fig.K** for adjustment

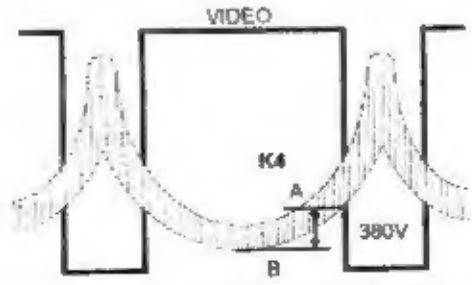
Fig.K

Adjusting Value of K4

K4 : Set to voltage A-B

A : Crossing VIDEO and DAF

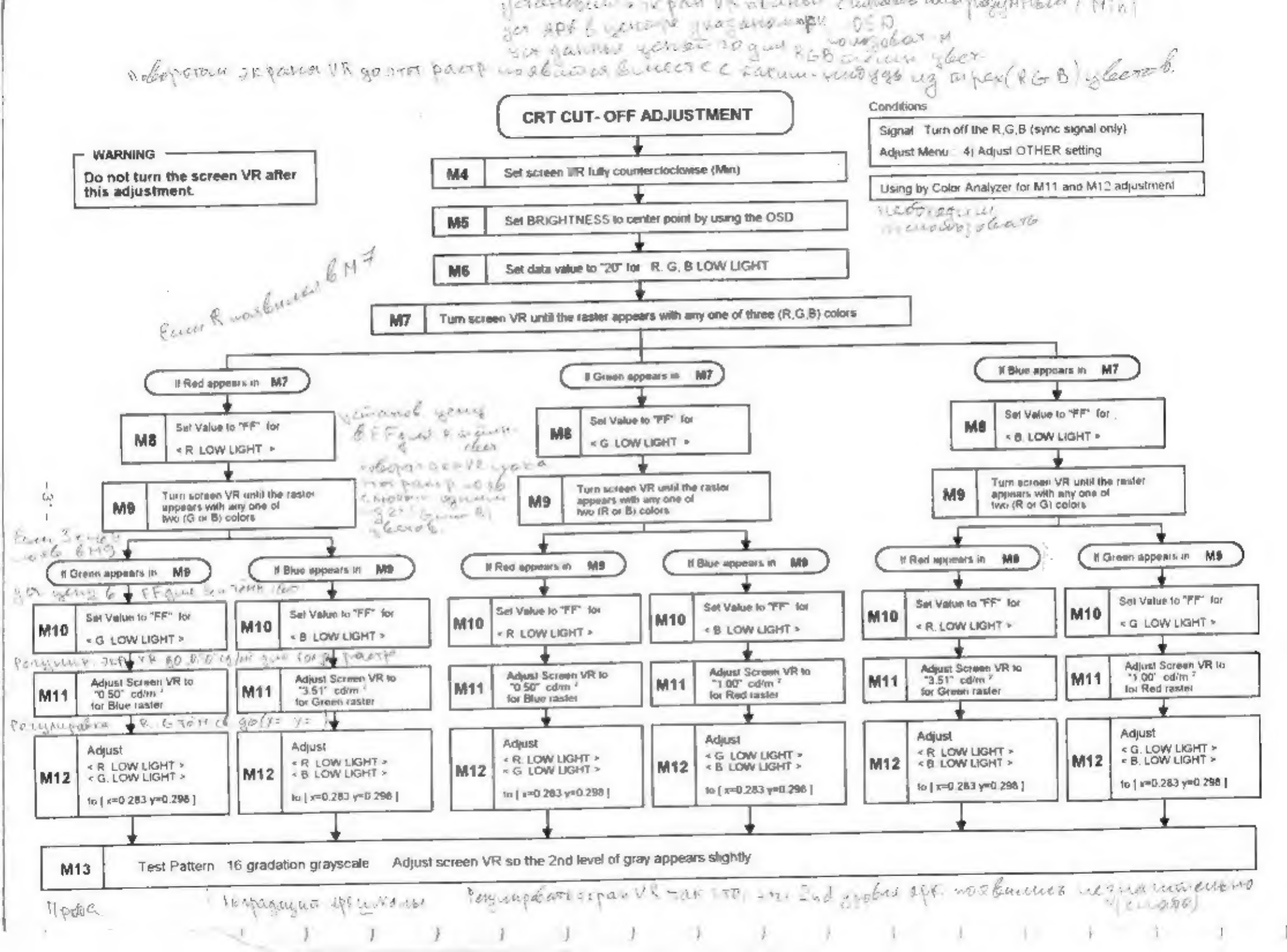
B : Bottom of DAF



	Program Menu Item	● Test Meter ↓ Test Point ▯ Pattern	JOB CODE	Input Signal	Operation	Adjusting Value
L	**FOCUS**	▯ Character	L1	Mode-1	Check that the input signal to the monitor is [fH 60.0kHz] and [fV 75.0Hz]	
			L2		Make the corner sections of the screen optimum by turning FOCUS VR 1 on the FBT.	
			L3		Make the center section optimum by turning FOCUS VR 2 on the FBT	
			L4		Repeat **L2** and **L3** to make it optimum.	
M	**CRT CUT-OFF** 4) Adjust OTHER setting	● TV Color Analyzer II ▯ RGB Off (Sync only)	M1		Set the Contrast to MAX. Brightness to Center and Color is 9300k by using the OSD	
			M2	Mode-1	Check that the input signal to the monitor is [fH 60.0kHz], [fV 75.0Hz] and turn off the RGB signal	
			M3		Set the cell to the menu at left and press [↵].	
			M4		Make the adjustment R,G and B Low Light by using [←] [→] and Screen VR to CRT cut-off.	
			~			
			M14		**Please refer to flow chart for this adjustment on page 31.**	
	BRIGHTNESS & COLOR ADJUST	▯ White window (5cm×5cm at the center)	M15	Mode-1	Change to the pattern at left.	
			M16		Move the cell to the following items and make the adjustment to the value shown at right by using [←] and [→] R_SUB CONT 9300K G_SUB CONT 9300K B_SUB CONT 9300K	Y=130 cd/m² x=0.283 ±0.020 y=0.298 ±0.020
			M17		Set CONTRAST to MIN by using the OSD	
			M18		Move the cell to the following items and make the adjustment to the value shown at right by using [←] and [→] R_LOW LIGHT **Adjust two colors only** G_LOW LIGHT **out of these (RGB) three as** B_LOW LIGHT **shown in M12 on page 31.**	x=0.283 ±0.020 y=0.298 ±0.020
			M19		Set CONTRAST to MAX by using the OSD	
			M20		Check the value shown at right, then ■ out of range to repeat **M16–M20**	Y=130 cd/m² x=0.283 ±0.020 y=0.298 ±0.020
	ABL	▯ White flat field (full window)	M21	Mode-1	Set CONTRAST to MAX by using the OSD	
			M22		Change to the pattern at left.	
			M23		Move the cell to ABL 9300K and make the adjustment to the value shown at right by using [←] and [→]	Y=110 cd/m²
			M24		Press [E] to return to main menu	
	DATA SETTING 8) Special ADJUST		M25		Set the cell to the menu at left and press [↵]	
			M26		Select the 2. ADJUST COLOR from the menu This messages will appear : **Calculate COLOR 6550K data automatically . OK ? >**, press[Y]and [↵]	
			M27		**Calculate USER COLOR data automatically . OK ? >**, press[Y]and [↵]	
			M28			

- To be continued -

Program Menu Item		• Test Meter ↓ Test Point □ Pattern	JOB CODE	Input Signal	Operation	Adjusting Value
			M29		**Calculate ABL data automatically . OK ? >**, press[Y]and [↵] **finished . (Hit return key).**	
			M30		Press [↵]. to menu of **M26**	
			M31		Press[E] [↵]. to return to the main menu	
M	**1.0V ADJUST** 8) Special ADJUST	• TV Color Analyzer II	M32		Set Input Video Level 1.0V using the OSD of the monitor.	
			M33		Set the cell to the menu at left and press [↵]	
			M34		Select the <u>1. ADJUST VIDEO 1.0Vpp</u> from the menu	
		□ White window	M35	Mode-1	Change to the pattern and signal level at left	
		(5cm×5cm at center)	M36		Make the adjustment to the value shown at right by using [←] and [→]	Y=130 cd/m^2
		1.0V p-p video	ME		Press [↵] to return to menu of **M34**, then press [E] [↵] to return to the main menu	
N	**FINAL TUNE** 8) Special ADJUST		N1		Set the cell to the menu at left and press [↵]	
			N2		Select the <u>9.FINAL TUNE</u> from the menu. (Step 1) Data tuning This messages will appear : **<loading EEPROM data> ...end** **<tuning EEPROM data> ... end** **<saving data to EEPROM> ... end** **<RECALL data - PRESET data> wait a moment** (Step 2) Erase user preset data **Erase All ' user preset data OK ? >**	
			N3		Press(Y)or(N)and [↵], go to **N4** (Step 3) Calculate color data **Calculate COLOR 6550K data**	
			N4		**automatically . OK ? >**, press[Y]and [↵] **Calculate USER COLOR data**	
			N5		**automatically . OK ? >**, press[Y]and [↵] **Calculate ABL data automatically . OK ? >**	
			N6		press[Y]and [↵]. **finished . (Hit return key)**	
			N7		Press [↵]. to menu of **N2**	
			NE		Press[E] [↵]. to return to the main menu	
O	**DATA SAVING** 7) Save data to file		O1		Set the cell to the menu at left and press [↵]	
			O2		Key in the file name after [ ] : Use serial number as a file name (EXAMPLE : FF6110001 = "F6110001.DAT")	


CRT CUT- OFF ADJUSTMENT
Conditions
Signal Turn off the R,G,B (sync signal only)
Adjust Menu 4) Adjust OTHER setting
Using by Color Analyzer for M11 and M12 adjustment
WARNING
Do not turn the screen VR after this adjustment.
M4 Set screen VR fully counterclockwise (Min)
M5 Set BRIGHTNESS to center point by using the OSD
M6 Set data value to "20" for R, G, B LOW LIGHT
M7 Turn screen VR until the raster appears with any one of three (R,G,B) colors
If Red appears in M7
If Green appears in M7
If Blue appears in M7
M8 Set Value to "FF" for < R LOW LIGHT >
M8 Set Value to "FF" for < G LOW LIGHT >
M8 Set Value to "FF" for < B LOW LIGHT >
M9 Turn screen VR until the raster appears with any one of two (G or B) colors
M9 Turn screen VR until the raster appears with any one of two (R or B) colors
M9 Turn screen VR until the raster appears with any one of two (R or G) colors
If Green appears in M9
If Blue appears in M9
If Red appears in M9
If Blue appears in M9
If Red appears in M9
If Green appears in M9
M10 Set Value to "FF" for < G LOW LIGHT >
M10 Set Value to "FF" for < B LOW LIGHT >
M10 Set Value to "FF" for < R LOW LIGHT >
M10 Set Value to "FF" for < B LOW LIGHT >
M10 Set Value to "FF" for < R LOW LIGHT >
M10 Set Value to "FF" for < G LOW LIGHT >
M11 Adjust Screen VR to "0.50" cd/m² for Blue raster
M11 Adjust Screen VR to "3.51" cd/m² for Green raster
M11 Adjust Screen VR to "0.50" cd/m² for Blue raster
M11 Adjust Screen VR to "1.00" cd/m² for Red raster
M11 Adjust Screen VR to "3.51" cd/m² for Green raster
M11 Adjust Screen VR to "1.00" cd/m² for Red raster
M12 Adjust < R LOW LIGHT > < G LOW LIGHT > to [x=0.283 y=0.298]
M12 Adjust < R LOW LIGHT > < B LOW LIGHT > to [x=0.283 y=0.298]
M12 Adjust < R LOW LIGHT > < G LOW LIGHT > to [x=0.283 y=0.298]
M12 Adjust < G LOW LIGHT > < B LOW LIGHT > to [x=0.283 y=0.298]
M12 Adjust < R LOW LIGHT > < B LOW LIGHT > to [x=0.283 y=0.298]
M12 Adjust < G LOW LIGHT > < B LOW LIGHT > to [x=0.283 y=0.298]
M13 Test Pattern 16 gradation grayscale Adjust screen VR so the 2nd level of gray appears slightly